CHEATING THE JUNK-PILE

ETHEL R. PEYSER

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THE ELECTRIC REFRIGERATOR FITS INTO SCHEMES OF LIVING AS WELL AS TO KITCHEN DECORATION

Cheating the Junk-Pile

THE PURCHASE AND MAINTENANCE
OF HOUSEHOLD EQUIPMENTS

BY
ETHEL R. PEYSER

NEW AND ENLARGED
EDITION

WITH AN INTRODUCTION BY
RICHARDSON WRIGHT
Editor of "House and Garden Magazine"

Illustrated by
HARRY RICHARDSON

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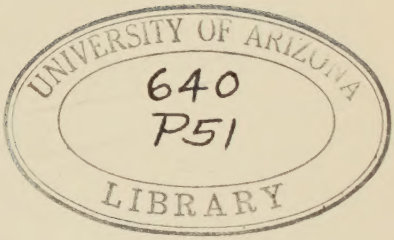

PRINTED IN THE UNITED STATES OF AMERICA

To

"HOME AND MOTHER"

The Experience of Both has

Made this Collection Possible

76175

ACKNOWLEDGMENTS

This book cannot go on its way without acknowledging Richardson Wright, Editor of *House and Garden Magazine,* at whose request the chapters were written, as the source of it and as the stimulus to the gathering of the material. I also want to acknowledge the unflagging services of Celia Arbeit, his secretary, who at every point helped in collating the straying text and furtive photographs.

I must not forget the manufacturers, who have supplied me with information, illustration, and enthusiasm, and also the several experts who were philanthropic enough to read every chapter (before they came out in *House and Garden*) to eradicate any technical or scientific anachronism that might have lurked therein. To all these and others who have helped I am very grateful.

E. R. P.

New York City
August 1922

AUTHOR'S FOREWORD

Ignorant buying is the junk-pile's subsistence.

This book is in no way intended to be a book on household efficiency, in the usual sense of the word—it is no religio-culinaris, no domestic Baedecker or home Taylor. It is merely meant to be a means to the purchase and care of the best household equipments and to be an instruction *before* not after the purchase is made. Further, it is meant to cheat the junk-pile, by inspiring the buyer to get the maximum advantage out of every purchase of the thing he buys and by the proper care of it after he gets it. It is a book which conspires against the aspiring junk heap in the yard or in the store-room.

There is so much in the market to-day in the way of household equipments and devices, that a book like this is necessary to give the home-keeper as much of an idea as to what to *eliminate* as to what to choose. It is necessary, too, to give the home-keeper an idea of the maintenance of what she has elected to buy, as the proper care of possessions adds 100% to their longevity.

In every case in this book the very best devices are discussed. If the reader feels that in any case a too expensive article has been delineated at least he (or she) will get from the discussion of the thing, an idea and ideal of what is to be demanded of this sort of device . . . and if she (or he) be improvident, will immediately buy a *cheap* thing instead of waiting until he (or she) can afford a better article if not the best. In short, the

purchaser should demand in every purchase the largest collection of "best traits."

So this book, then, aims to give the purchaser an idea of what things or *qualities* to buy; to stimulate the manufacturer who is ready to furnish them when given a reason for doing so; to make of every purchase a paying investment, not a mere expenditure; and to cheat the Crœsus-like junk-man out of his expected heritage.

Due to the time it takes to print and publish a book the reader will realize that there may be new things created which could not be included herein.

E. R. P.

AUTHOR'S FOREWORD TO SECOND EDITION

Due to the constant demand by housekeepers, builders, architects, industrial companies, teachers—and brides—for a book on modern household equipments brought up to date, the publishers have felt the necessity for making a second edition of "Cheating the Junk-Pile." This is not what is popularly called a second edition—for that means merely a second printing. This volume is a *new* book.

Since the first edition, many new fields have been opened for living and working in the home more conveniently, expeditiously, healthfully, happily, and beautifully. Therefore, this new edition includes gas refrigeration, new hot water methods, electric refrigeration, gas furnaces, new window glass, floor scrapers laundry dryers, and other new devices, their purchasing technique and their "bringing up."

Both the heralded newcomers in the home equipment field and those with which you are not yet familiar, we hope will become a matter of pleasant acquaintanceship and helpfulness, through the use of this untechnical résumé of the everyday mechanics of the home. We hope, too, that you will save effort, time, and health—in knowing before you buy—one of the most *saving* graces to us all.

All but one of these chapters have appeared in *House and Garden Magazine,* of which the author has been Household Editor for a decade. The chapter on Insu-

lation appeared in *Country Life*. To Mr. Richardson Wright, of *House and Garden* and to Mr. Reginald Townsend, of *Country Life*, I therefore gladly give my gratitudes and obeisances for permission to reprint.

E. R. P.

INTRODUCTION

THE HOUSEWIFE AS MANAGER AND PURCHASING AGENT

Several years ago we heard a great deal of talk about women's place being in the home. The slogan was used as a campaign challenge and as a sneer. It was bandied up and down the country-side until we got pretty tired of hearing it. Since the privilege of voting has been given women and since their weight is being felt in elections, the cry has died down. The simple reason is that neither the employment of women in war-work nor the radical challenges of the ultra-feminist has altered the fundamental fact that the home is a woman's realm. Now you can banish her to the home and make it such a place of drudgery that she loathes it; or she can abide there as a queenly figure, director of its work.

Thanks to the inventive genius of our manufacturers, the home has ceased to be a place of exile for a woman. The long hours that used to obtain in housework, the wear and tear on nerves and muscles, are being cut down by labor-saving equipment. The shortage of servants is being met with the same devices.

It can never be expected that a big house will be totally servantless. Utopia is still far away. But it can be reasonably expected that every house will get along with fewer servants. The hope of this expectation lies in two salient features of these times: (1) the simplifying of our home life; (2) the position of the housewife as a manager.

One of the reasons for the high cost of living has been the complication of our living. The past generation has been brought up to feel that so many more things are necessary to comfort than was the previous generation. Short cuts to comfort cost money. The grocery order sent over the telephone saves steps but adds to the bill. The dress bought ready-made is a convenience—and an extra expense. The food and drink picked up at shops have added to the cost of living—especially the drink. Nowadays Congress is encouraging the making of drinks at home, sensible women will take a basket on arm and supervise their own buying at grocery stores, and we are forgetting the silly twaddle about clothes not looking tailor-made. The way to meet the high cost of living is to simplify the manner of living. And the way to simplify the manner of living is to live more at home and do more at home.

We've reached the ebb-tide. The flood is leaving the restaurant and the cabaret and turning toward home. Make no mistake about that. We are being cleansed with the fire that we ourselves kindled. The home is coming into its own, and with it, the woman in the home.

Taking them by and large, our grandmothers were pretty good managers. They didn't have vacuum cleaners or electric toasters or telephones or a lot of other equipment that has cut down housework today, but, if you will remember, they did have a very decided system in running and managing their households.

Our mother's day saw the introduction of labor-saving devices. The household work then stood on the threshold of a new era, but it didn't have the courage to put a foot across. Moreover, the equipment had not reached the degree of proficiency where it could be con-

sidered practical. The machinery of household equipment complicated living.

This present generation has the perfected machinery and much more to come, but it lacks what our grandmothers had—a system. We are dealing with old problems with new equipment. It is a case of old wine in new bottles, and we have to find a way of handling it. The secret, of course, is a system, a policy.

The housewife of today is to her home what a man is to his office. She is a house manager, a Domiologist, as the author of this book suitably coined. To be successful in that sphere she must apply the same principles of management to her work that her husband does to his. She must consider three things: (1) household policy; (2) household equipment; (3) employed personnel.

The employed personnel not only includes the cook and the other servants of the house, but also the grocer from whom the vegetables are bought, the butcher, the dealer in housewares. There is just as much reason for looking into the character of her butcher before she buys from him as for looking into her cook's reputation before she hires her. In this respect the housewife is a purchasing agent and she should apply the same exacting principles that a purchasing agent of a factory does.

The household equipment can generally be divided into departments, just as office work is divided into departments. There is the cooking department, the laundry department and the cleaning department. These will be large and small according to the size of the family and the house. Each requires its own equipment and each should be kept separate—the cleaning instruments such as brushes, brooms, vacuum cleaner, dust cloths, etc., in their own department or closet; the

things appertaining to the kitchen in the kitchen; the laundry equipment, soap, clothes-lines, etc. in the laundry. Some household managers may say that this is an old story. Yes, to them. But hundreds of women complicate the household work by not using this departmental idea. So soon as they do, household work begins to straighten out.

A household policy is less easy to define. In an office a policy is the way of conducting business—both the way and the purpose. In a house it should be the same.

It is this that the author of this book reiterates over and over again, a policy and system in the department of the installing of labor-saving and work-doing machinery and devices and operations to reduce the irksomeness of household management. It is this that the readers of *House and Garden Magazine*, wherein this book appeared serially, have enjoyed. Men and women have profited by its accurate technical discussion and by the delightful presentation with its occasional bits of humor. For these reasons I gladly recommend it to its future public which I feel sure has need of it, consciously or unconsciously.

RICHARDSON WRIGHT

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Cheating The Junk-Pile

CHAPTER I

INTRODUCING YOU TO ELECTRICITY

WHAT'S a watt? This is not a comic opera refrain, but a question asked so many times that it is typical of the lack of knowledge people have to-day of the force which they are using constantly in their own homes and others.

We have lived to see women go to automobile schools and learn the working of the car which is theirs to drive. But as yet there seems to be no course even in the domestic science school which gives the household engineer an inkling of what is to be her mechanical field in the realm of electricity or ordinary mechanical construction. We hope this will come.

For have you ever stopped to think that the housekeeper to-day presides over an extensive electric installation? Even if she has but a telephone and an electric bell in the house, there is much that happens that ought to be familiar to her.

But people to-day have much more than these few things; they have at least three or four of the following: ironing machine, washing machine, vacuum cleaner, telephone, warming pad, electric lights, toaster, electric piano, sewing machine, curling iron, electric range, electric iron, etc., yet the underlying principles and vocabulary are still as Sanskrit to the majority of users.

This article is but to make simple and comfortable

electric terminologies and we will use this for an excuse to get at a few electrical misusages. It is to make electricity familiar rather than a stranger to the user. Nobody knows what electricity is, so fortunately, we don't have to stop and define it. All that we know is that it acts in certain definite ways.

We get electricity from the battery and from the generator (dynamo). The battery consists of celled containers which come under the heads of dry and wet batteries in so far as they contain liquid or solid (wet) ingredients, through which the electricity is generated and passed out by means of wires. In short the battery produces electricity by means of chemicals. The primary battery produces electricity and the storage battery stores it in the form of chemical energy. It is useless for purveying very much electrical power as there never can be enough pressure (voltage) to send along the electricity to do big jobs, unless hundreds of cells connected in a certain way were used, which would be a foolish waste of material and time, etc.

In order to obviate such manufacturing the generator or dynamo is used and electricity is made in this way by induction. In other words, we make it by letting a coil of wire (or several coils) be revolved by steam or water power (usually) as it cuts through the area of magnetism (field) of a giant magnet something like those we used when we were children. This coil catches the electricity and it is led off by wires wherever we want it to perform. The coil on the spindle is called the armature, where the wire is attached to lead off the electricity from the armature are contact-pieces, and the plates which make the contact with the contact pieces and to which are attached the wires of the out-going electric circuit are called the brushes. There is much more to say, but not in this article. If you are interested

we refer you to Charles R. Gibson's "Romance of Electricity" for simple electrical explanations.

The motor with a few mechanical changes is the reverse of the dynamo; it works by electricity and changes it into mechanical power to work our washing machines, etc. There are on the market A. C., D. C., and Universal motors. These you will understand after the next section which takes up A. C. and D. C. electricity.

"Madam, do you use A. C. or D. C.?" asks the man selling you a washing machine. Most decent folks are quite at sea at this seemingly geographic question, and yet after all it is the most complicated simple thing in the world. D. C. doesn't mean District of Columbia; it simply means Direct Current. And A. C. means Alternating Current. And on these two kinds hang all the wires of electric profits.

Direct Current or D. C. is a current that runs in one direction over the wire like water through a pipe. It is simple to visualize, even if electricity does flow 163,000 miles per second. But alternating current (A. C.) is electricity which alternates and goes back and forth, generally. Even though it goes back and forth in waves of tremendous rapidity, you can see that there must be a time in this period when the electricity is for an infinitesimal space of time at low power, and another infinitesimal space of time at high. In order to keep the supply even and steady, two and sometimes three coils of wire are used in the generator to catch the electricity so that there is scant opportunity for the electric supply to be anything but even, for when one coil is up the other is down and thus they even up the strength of the current.

So when your salesman asks you when you buy a motor, "If you have A. C. or D. C. electricity" and you say A. C. he may go on and say, "How many phase?"

Then you should find out the answer from your lighting company. He then may ask you how many cycles, which when translated means the electric period it takes for the alternating current to flow back and forth.

Now dynamos for D. C. and A. C. electricity vary slightly, but that need not trouble *us*.

The reason for two kinds of electricity at all is that each, though obeying the larger laws, has its own peculiar habits and good points.

For example, alternating current can be carried long distances at high pressure (high voltage) and sidetracked by a transformer to a little home and the pressure very simply reduced. In other cases the pressure can be very simply increased. Therefore in country districts one is very prone to see A. C. in vogue.

The same amount of current, whether D. C. or A. C., is used for lighting, etc.

A. C. is not used for electro-plating, etc., or for storage batteries. This is a good point to remember if you have storage batteries to supply for bells, etc., and your current is A. C. You will have to have your batteries charged from a plant which makes D. C. or install a small "converter." If you attempt to use the A. C. you will burn out your plates.

But how is electricity measured? How, in other words, do we know how much we use and how can we test our bills? The following paradigm will give the electric measures translated into more familiar terms of water measurement:

Volt	Pressure
Ampere	Rate of flow of current per second
Watt	Fraction of horsepower (H.P.)
Kilowatt (1000 watts).	1⅓ H.P.
Resistance	Friction (as water resists the sides of a pipe.)

Ohms (the unit of measuring resistance). Friction (as water resists the sides of a pipe).

The volt takes its name from Volta, an Italian scientist; the ampere from a Frenchman, the ohm from a German, the watt from an Englishman. We hear most about volts and watts. Voltage is found by multiplying the ohms by the amperes. The volt is the pressure that makes electricity flow through the wire, and the friction of resistance to its flow is measured by the ohm.

The amount of work a given number of amperes will do at a certain voltage (pressure) is known as watts.

So if by chance you ever need formulæ here is a little one for your card catalogue:

Ohms×amperes=volts.
Volts÷ohm=ampere.
Volts×ampere=watts.
1 Kilowatt=1000 watts.
1000 watts=1⅓ H. P.

The next thing which is necessary for the householder to know is how to compute costs of electrical usage.

The amount of electric power used, for example, by the electric light is measured in watts. Look on any incandescent bulb and you will see thereon the number of watts—usually around 50 or 60.

In order to know how many watts a light consumes, divide the number of watts it consumes by 1000 to reduce it to a something of a kilowatt. Then multiply this result by the number of hours the lamp has been lit by the kilowatt to get the kilowatt hour of electricity. The kilowatt hour, of course, multiplied by the rate per kilowatt hour in your locality will give you the cost. The rate is always figured on the kilowatt hour.

Watt÷1000=kilowatts.

Kilowatt×hours=kilowatt hours.
Kilowatt hours×rate=cost.

Probably it would be a good thing to know how to read the meter, which generally consists of four little dials which are read from right to left. The first dial measures the tens, the second the hundreds, the third the thousands, the fourth the ten thousands. Therefore if the hand in the left has passed 9, that would stand for 9000
In 2nd dial nearest to 1 that would stand for 100
In 3rd dial nearest to 2, that would stand for 20
In 4th dial nearest to 1, that would stand for 1

9121

The total is 9121 kilowatt hours and this multiplied by the rate (say ten cents) as it is in some places, would mean that the bill for this consumption would be $92.2. Now, knowing from your last month's bill that the reading of the meter then was 82000—by subtracting you find that the actual current consumed was 921 K. W. hours, which multiplied by rate (say ten cents) gives you $92.10 as your bill.

To quote from an article in this series on electric ranges will give you an idea as to how to buy in accordance with voltage and how the cost is reckoned in watts:

"It is necessary when ordering a range to give the voltage of your electricity supply. The stoves are usually prepared for 110-220, 110 volts with two wire service from the street or 110-220 volts with three wire service. In some stoves the cut-out box is built on the range directly back of the switches. This, then, can be easily opened if anything happens. In the stock stove there is made an extra charge for voltage exceeding

220 or less than 110, because alterations have to be made.

According to the size of heating elements in the stove, etc., the wattage runs from 10,000 watts or 10 kilowatts, which is the same thing, to about 2500 watts, or 2½ kilowatts on a small three-heating-unit range. This gives its total capacity if everything goes at once. The number of watts used, multiplied by our local rate, say four cents, gives the cost per kilowatt hour, which in this case would be 40 cents per hour.

Have you ever wondered how electricity changes from current to heat? Have you ever wondered how we can cook, and iron, and warm a room by it?

It is due to electricity's resistance, which is measured in ohms. It is resistance which is turned into heat. The process of overcoming resistance results in throwing off heat. It is quite familiar.

Did you ever rub a piece of wood in the palm of your hand for a little while and feel the heat given off? We call it friction, but it is really the giving off of heat due to expenditure of mechanical energy.

The same thing happens with the electricity. This electricity which travels at the speed of 163,000 miles a second, when it comes into frictional relation with its conductor pushes aside the molecules of the metal, and here the mechanical energy is magically transformed into heat.

Some Technical Terms

When we hear short-circuit mentioned, what does it mean to us? Well, it should mean that the path of the electricity (electric circuit) has been suddenly shortened, the electricity has escaped through the ground or over another conductor.

Insulation is the covering by which the escape of

electricity through the wire is made impossible. Always see to it that the insulation is in perfect condition.

All wires must be insulated. In damp places rubber covered wire must be used.

Wires must always be protected with porcelain tubes passing through partition walls, girders, and where they pass over pipes, and other wires, etc.

Incandescent lights are merely globes with a vacuum in which a filament or tungsten or some other highly resistant material meets the electric current and glows through its very resistant power.

The switch is merely a device to open and close the path of electricity.

The socket is the termination of two wires from the generator or battery, into which the bulb of the light is put and other connections made.

You will notice two wires on every electric connection. This is to make a complete electric circuit (path) to and from the points where it is used.

The outlet is the opening where the socket can be placed. The more outlets you have in your home before building the better off you will be forever and ever. A convenient outlet (sometimes called a baseboard or wall receptacle) is simply a place for conveniently connecting electric appliances to your electric current.

Fuses are things we hear much about. They are the stop-gaps really between danger and safety and though they make a splutter when they "blow out" it is right that they should. Briefly, the fuse is a bit of lead or other metal with a low melting point so placed that when the circuit gets overloaded for any reason the metal will melt and open the circuit, stopping the electricity and preventing danger.

When the fuse burns, we call that a blow-out, but this burning has saved us from dangerous currents.

Every house should be well supplied with fuses, and as soon as they are blown out, restored. Your superintendent or electrician will show you how to restore the oft blown-out fuse. So it is wise to keep a few new fuses in one's home.

The fuse will blow out sometimes if you allow a bit of metal from a lamp shade to cavort too intimately with the excitable parts of your incandescent bulb; then the wire gets overloaded and the tin or lead conductor on the fuse melts and prevents the greater current doing any damage. It's simple, isn't it? The fuses come in convenient shape. Sometimes it is wise to use a rubber glove when putting them in. We have seen a sparking do a bit of burning.

Electricity is not dangerous when properly employed. It is dangerous when you use it wrongly. If you put your hand under a boiling hot stream of water you will get burnt. If you put your hand on a red hot stove you will get burnt; if you burn a fire in a wooden box you will have more fire than you bargained for; if you inhale gas you will die. Such is the case with electricity, which is a most controllable force if you are not ignorant as to how to use it. However, if you will put a hot curling iron on your table without turning off your current you will have a cozy little fire start up; so you would if you laid down a cigaret without putting it out. Most accidents occur simply because of such ridiculous carelessness. Mr. A. M. Grant of the Manhattan Electrical Supply Company said a wise thing in reference to this subject: "Before connecting any appliance to your lamp socket turn out the light in your bulb; then you know that your current is off.

Never attach anything to anything electrical until the current is off and never go away and leave an appliance with the electricity turned on."

More specifically, in using any electric appliance non-continuously, shut off the current immediately upon stopping. Do not only pull out the plug but turn off the electricity.

In using the flat-iron detach the plug at the iron as well as turn off the current from the socket.

Remove the iron from the goods and detach the plug when called away from the ironing board.

Never pull the plug out by the cord; always grip it at the spring.

Always replace at once frayed wires—as the ends often collide and make blow-outs.

Don't leave your electric curling iron on the table cloth and do something else about the room without first turning off the current—or you'll have a cute little fire.

Care must be taken in using too many cluster plugs, because the electric circuit (path) may be overloaded. That is, too much electricity drawn over the wire which is made for a certain load. Then your fuse will blow out. Extra appliances should be attached to different circuits. This a good electrician will regulate for you. Too much wattage (horsepower) over one circuit is like forcing any machinery to the breaking point. A percolator, toaster and a lamp are too heavy a load for the ordinary circuit. Connect at the same place only those appliances that are of low wattage.

Some firms have now made percolators and water heaters with fuse-nut or safety fuse devices which melt if overloaded or allowed to heat up without any liquid in them to be heated. You must not let a percolator "perc" without any water in it. People complain more about good percolators because their heating element

burns out, either because they do this or because they have it connected up with too many other devices. Even if you do the right thing in these respects, don't forget to disconnect the electricity by pulling out the plug.

Don't get your electricity heating pad wet. In fact, don't wet any electric appliance carelessly or you may have a short circuit.

Remember that electricity, magic as it is, can burn as well as any flame, so don't let your curtains blow against a red hot electric radiator and then blame it on the electricity which after all is your servant if you make it so by right treatment.

Always ask your salesman to what the device purchased should be attached. Some things are designed for the ordinary lamp socket, and others need different connections.

Many electric appliances have the pilot light to tell you whether your electric current is on or off. Yet it is wise to be your own pilot and remember what you are doing.

Do not leave your electrical installation entirely to your architect. Watch what is happening. Remember you need as many outlets as you possibly can afford; the more you have the better lighting you can have, the better electric comforts you can have. If you have few outlets you are very prone to overload your circuit, and in the future as more electric devices come into being you will have to pass them up. Outlets consume no electricity but are simply entrances where electricity can be located as soon as the appliance is connected up with it and turned on.

Above all, have your electric installation put in by the most responsible and experienced people you can get to do it.

When you buy appliances always ask what voltage they require and find out what your own voltage is before you buy; also find out whether you have D. C. or A. C., and if A. C. find out what phase and cycle. These things will save you time and money and free you from any apprehension of calamity from the use of electricity.

There is much left unsaid in this chapter. It would take a book by itself to say everything.

CHAPTER II

KEEPING OUT OF HOT WATER

THERE is never any magic about household equipment. You must not expect to do the impossible. If you have a dishwasher you must not expect it to do any more processes of washing than you expect of your player piano of playing. The dishwasher is to wash, the piano to play.

Many women have said, "I think a dishwasher is a nuisance, you have to stack your dishes, hand-scrape pots and pans, carry water by the pailful and then have the job of cleaning the dishwasher itself. The only thing it does is to wash off some of the dishes."

Well, it is only a dishwasher. Doesn't the automobile have to be cleaned and oiled? Why should the dishwasher be expected to polish silver.

Yet we do solemnly think that the dishwasher attached to the plumbing of the house, so that the fresh water comes in unlifted by the operator and goes out unheeded, is the only dishwasher to buy, regardless of how it is worked—by hand, by water force or by electricity. This is only one type.

Some of the best dishwashers are made unattached to the plumbing so that they can be wheeled into the dining room and be stacked as they leave the table. This is a rather perfect type for some homes, but you must have it fixed so that when it arrives dish laden in the kitchen or pantry it can be attached to the water supply and emptied through the sewer. This is the only

way to get maximum comfort, unless you or your cook enjoy hauling pails of water.

Yet we can imagine many women who would rather haul water than handle dish water. And here is where the "unattached" dishwasher wins out over the old-fashioned style of washing dishes. The chances of breakage are less where the dishes are not washed separately and rehandled for drying separately. Dishes handled when dry do not slip so readily, to fall or break.

For the most part these machines are equipped with a motor which propels a fan or paddle to spray or "swish" and whirl the water about among the dishes. The efficiency depends not only on the speed the water travels but on the direction.

For example, one of the most interesting of dishwashers is not run by hand or electricity, but it is attached to the drain and water supply. The hot water is distributed and so forced against the dishes that, without soap, they are washed noiselessly. No soap is required with this machine.

It has taken us a long time to be sold to this dishwasher, but we are convinced that it is the type to use when one has to do one's own work.

If it is possible to use very hot water in your dishwasher, you can leave the top of your machine off and the dishes will dry without handwork. Of course, there will be no polish on the glass and silver, but they will be dry.

The following is advice given by those who sell dishwashers:

1. You must have hot water—really hot water—to use an electric dishwasher successfully.

2. Use the soap powder the manufacturer supplies or recommends. Remember that suds are unnecessary

A WAY TO KEEP OUT OF "HOT WATER"—THE PORTABLE DISHWASHER

for cleansing and are hard to rinse off, anyway. You need an ash powder which will cut grease.

3. Dishes covered with egg, flour mixtures, etc., should first be held under cold water. Hot water boils these mixtures and makes them stick closer to dishes.

4. Follow the manufacturer's directions as to placing dishes, silver, etc. Get the knack—which is easily acquired—of putting in the dishes with the fewest motions possible.

5. Experiment with the much disputed point of whether dishwashers will wash pots and pans. Most dishwashers will clean them of everything except burnt-on food or particles which have to be taken off with a powder.

6. Note how easy it is to dry the silver and polish glassware, and that while you are doing this the china dries itself and needs only to be put away.

7. If you have a small family do not wash the dishes after every meal, but stack them in the dishwasher and wash them once a day, say after breakfast.

8. Remember that dishwashing is but one of a series of kitchen operations. To begin at the beginning, and to get the utmost value out of the electric dishwasher, glass, aluminum and enamel cooking utensils are to be recommended, wherever possible without handles, so that they do not take up too much space in the machine. In cooking and serving, clean up as you go, using as few utensils as possible in your cooking (all modern houseworkers recommend this procedure, although it does not always meet with the approval of housekeepers generally), stacking bowls, plates, spoons, etc., in the dishwasher as you work, thus having a comparatively clean kitchen when you are ready to serve the meal.

9. See that the dishwasher is properly placed in relation to the entire dishwashing performance. The ideal

placement is near the dining room or pantry door, so that it receives the dishes without extra steps, and adjacent to cupboard where dishes are put away.

You will perhaps think this is a lot to do, but didn't you have to learn to "do" things on your vacuum cleaner, your washing machine, your typewriter, too? Weren't you willing to learn how to run your own car?

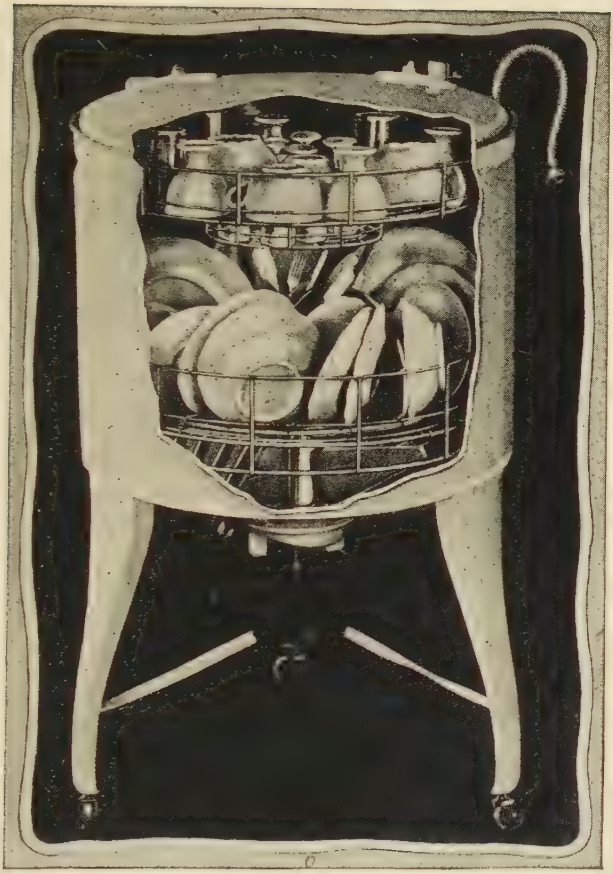
When buying a dishwasher, look at the racks. Be sure they are smooth and easily cleaned, finished so that there is naught to peel off and catch food. Also be sure these racks fit and are not cantankerous in going back into the machine. If they are difficult to manipulate the misery is untold.

In purchasing look for the following points:

1. The dishwasher must be smooth inside.
2. No corners to harbor bits of food.
3. Self cleansing.
4. Dishes placed so as to be unmoveable and not stick together.
5. Cost of electricity low. from one to two cents per washing.
6. Capacity to be convenient to your uses.
7. Operates in kitchen or pantry.
8. Operates from three to fifteen minutes.
9. The water penetrates all sides of dishes.
10. Easy to fill and empty whether attached or unattached to water and outlet systems.

Some booklets advertise the fact that machines require only six quarts of water—less water than in ordinary dishwashing. The water, unless it is to be hand handled, need not trouble anyone. But it is a well known fact that dishes to be washed satisfactorily must have water used on them without stint.

The most satisfactory soaps are the white powders. A new powder, on the market, which isn't soap at all,



HERE IS THE DISHWASHER'S ANATOMY—ITS STOMACH IS FULL AND COMFY.

does not leave a greasy residue and make a difficulty of cleaning out the dishwater. In a good dishwasher, however, the water force banishes residue of all kinds.

One manufacturer of a good dishwasher is honest enough to say that for a good effect silver and glasses should always be polished coming out of the dishwasher, because any method of washing will always leave a film. Many a dishwasher has been sold on the pretext that this is unnecessary and the result has been dissatisfaction and a psychological dislike of the machine.

To be sure, an ordinary dirty pot or pan can be cleaned on a dishwasher. The burnt-on type of dirt must be scraped off by hand.

Warning: don't burn in food, so use utensils where you reduce this possibility to a minimum. Some dishwasher concerns supply you with hand-saving scrapers.

A dishwasher in the shape of a table, beautifully finished, makes it unnecessary to have an extra table about. This does its work well. One example of this table-high dishwasher has a device whereby the rack of dishes is lifted to a reachable height by lifting the lid.

Yet another cylinder type has a cover that goes back flat, on which can be laid the tray to be filled with dishes.

At present some of these machines make a slight noise in operation; yet many do not mind this. But in telling a story we must tell it all. Of course many other machines used in the home are no "modest violets" either. We don't need to listen hard to hear vacuum cleaners or patent brooms, but they work well despite their blatancies.

Washing machines are made in cylindrical and rectangular form and can be placed in small kitchens as well as large without inconvenience. Of course there are some machines called "Domestic" that are meant

for the domesticity of a home where there are seventeen servants and other things equally hotel-like. These are big and efficient but the ordinary apartment or small home could not afford to house them.

The dishwasher really is the crux of the economic problem. Many a girl would marry gladly without a maid, if the dishwashing was reduced to a minimum. One of these days when lovers offer dishwashers in addition to the conventional platinum solitaires, they will find winning a bride a much easier task than it is at present.

CHAPTER III

ELECTROCUTING THE WASH!

"CAN'T afford," is the first thing that is said against the installation of electrical equipment in the home. Equipment for offices is placed because it is saving of time and money and energy, but equipment for the home is often grudgingly installed just because makeshifts have been the rule for so long.

Quite true is it, that you often have a hard time to prove to your husband that the washer is a money saver, that the ironer too is a saver of money. But this can be done very easily. Let money talk and the machinery will almost install itself!

The laundry equipment, of course, is a serious thing and must be taken so. Many things should be investigated before buying, your needs known to yourself. Equipment should not, like marriage, be entered into unadvisedly, for when you spend money you must spend it as an investment and not as a mere lark. You must get your return on the investment or you have thrown it away.

If you do not know what to get, read, use shoe leather and ask those who have the thing you want. The manufacturers too are glad to talk over your needs.

Requirements of the Home Laundry

A satisfactory laundry depends on:—

1. The location of room, its relation to outdoor drying

and its relation to the source of supply of incoming laundry.

2. Proper floor, ceiling and walls. All joints curved, no corners.

3. Selection of equipment. The types and kinds best fitted to size of family and room.

4. The advantageous disposal of appliances purchased.

5. Thorough instruction of operators in the use of the machinery, as a good machine is useless unless the operator knows the requirements.

6. Proper care of appliances.

7. Sanitary conditions: light and ventilation. Good air is part of all good laundry work.

8. The acceptance of the worker to use cheerfully the machinery and the adequate payment of the worker.

9. Knowledge on the part of the housekeeper or mistress of the laundry procedure in order to oversee more intelligently the work done. *Women seem to think a knowledge of cookery* necessary but *give little heed to the importance* of the laundry.

10. A system developed and maintained for the laundering of clothes.

So much for the general principles. This chapter will not deal at all with methods of laundry work . . . as is.

The only reason for the electric laundry is that it does save time, money and energy and prolongs the life of clothes to a certain degree.

In doing missionary work in the past for these things, people said: "you can lead a maid to the washer but you can't make her wash." They said this too about the horse and the trough, yet if he never drank he would have died of thirst! So much for that argument. You may as well say: You can lead a cook to the soup pot but you can't make him stir!

Money talks to husbands! you can prove the saving.
Less work talks to laundresses, you can prove the saving.

Generally Speaking

A good equipment for a house with six in the family and three to four servants is as follows:

A tiled floor. The large blue tile is interesting and less glaring for the floor than the white. Linoleum floors too are splendid and cream walls.

Washer ⅓ h. p.; solid copper lined with planished tin to prevent corrosion, white enamel ironing machine, two rolls; clothes dryer with four heating units; clothes boiler solid copper lined with planished tin with screen for holding clothes off the bottom of the boiler; combination sleeve and skirt board; two metal tables; overhead clothes dryer, copper clothes extractor; four stationary tubs; electric irons for valeting and fine work.

The Electric Ironer

A great fuss has been made about setting the clock ahead one hour to save time and daylight, but little attention has been given the problem of saving four hours every ironing day by means of electricity and the ironing machine. A good machine, unlike the mangle which only folds and is not heated, should be able to iron at the rate of seven or eight feet per minute. In this way the ordinary ironing can be done four times as quickly as by the old method.

Many a house-wife without a maid has found ironing good sport with a good ironer and the labor saving devices have often made marriage possible—where a servant was too much of a luxury.

Roughly, the ordinary laundry takes about half a day

—one hour for eight pieces for the average family of five, including all things from table linen to handkerchiefs. By hand this is about four and a half to five hours. This costs about $50 to $100 a year or $500 to $1,000 for ten years' supply of laundered possessions.

The fuel consumed for the average ironing with coal or electricity costs about $15.60 per year: With a good machine ironing by electricity or gas will come to about one and a half cents, or a total of three cents for ironing and heating, which is a saving of twenty-seven cents a week or $14.04 yearly. In ten years a saving of $140. This is apart from the benefit to health and strength.

There is one on the market with a bench attached on which the worker can sit down to her work. As the feed is so arranged that the material turns under, because of the adjustable delivery board, one doesn't have to rise at all, and the saving of strength and comfort is beyond calculation.

An ordinary table cloth on an ironing machine takes about three or four minutes. With a good electric iron it takes about twenty-five to thirty. Besides this the cloth is ironed evenly and the pattern, if it be embroidered, is evenly brought out. Initials come out in beautiful relief, buttons on garments do not break because of the deeply padded felt rolls which are covered with an especially-made muslin.

As an ironing machine has proven a practical, money-saving proposition, what is the best way to purchase one? First, you should have a good idea as to the breadth on the average of your sheets and table cloths, not forgetting that it is wise to have a machine wide enough to carry two table napkins at once. This saves time, saves the over-impression of the felt in one spot and also uses up the whole length of heat along the roll.

In large households, where the work is unusually heavy, often taking more than one day, a machine about 48″ or 56″ is used for 2½-3 yards of linen. These rolls should be padded, the heavier the better, to take care of heavily embroidered initials.

Many persons think that an ironing machine is a mangle limited to ironing only the coarser flat work such as sheets, towels, etc. It is, however, not a mangle but an ironer and will iron practically everything except the more fancy shirt waists and elaborate dresses. It will iron to the entire satisfaction kitchen aprons, nightgowns, pajamas, underwear, children's play clothes, hosiery, men's negligee and silk shirts, and iron, better than an expert laundress can do by hand, tablecloths, napkins and centerpieces, doilies, dresser scarfs, blankets, sheets, bed spreads, pillow cases, towels and handkerchiefs. It is a great help to curtains, as they will hang perfectly after ironing. Trousers may also be pressed in such a machine.

The ironing machines on the market claim certain best points. One that a moveable shoe (the heated part under which the garment is passed) is good because you can remove starchy accumulations and clean it easily. Some say that the stationary shoe is the best because the ironing cannot help being done evenly. You will have to pick your machine.

In another machine the manufacturers use their patented gas burner of drilled holes and their air mixture as a talking point to afford a gas saving. Another claims that oiling is necessary only every six months.

The feed board is a requisite part which must be perfect. Lowering the feed board removes the roll from contact with the ironing surface in some machines. This is the same principle as putting the hand iron on the rest. At the same time the motion of the roll is

automatically stopped, so that the goods can be withdrawn at any time. It also enables one to lay a folded piece or a number of them on and over the roll, and it insures a straight start at all times. On single or double thicknesses of goods the feed-board need not be lowered, as these will start in readily. This patented feature means safety to the operator and safety to the goods being ironed. The feed-board is the flat piece of board running the length of the machine over which the linen passes.

Some machines are advertised as having all gears enclosed and protected. This, of course, makes operation safer.

The swinging arms, two generally, provided for hanging linen on, are a convenient addition.

An Extraordinary Advance

The above is the usual list of machines made to-day but there is an unusual one now on the market. This one works entirely by electricity, it can be heated by gas or electricity. There are no levers to handle, no treadles to tread. It works completely by a switch and dial. The little finger is sufficient only to do the job if all your other fingers were disabled!

It is a very convenient size for family use and has been in use now long enough to assure perfection of adaptability for the home.

In case this all-electric machine has a blow out, and to protect the clothes from burning on the shoe there is simple provision to guard against this and all ills. The shoe by a button works back and forth if necessary, and taken altogether it is a beautiful mechanism.

A few excellent machines, too, have the two rollers instead of one. This is supposed to hold material firmer and work more expeditiously.

Good Points

In some cases the gas burner and electric heater are divided in the center so that the burner can be used on warm work without scorching the unused part of the roll.

The machines should be so made that they are comparatively easy to clean.

Levers are not quite as good as the automatic, adjustable feed-board, which insures ease of control. It is worked by raising and lowering. This brings the roll in contact with the ironing surface, the same principle as a hand iron is brought to and from its rest. The action also stops and starts the rotation of the roller. In other words, it is automatic and there is no possibility of the operator becoming confused at a critical moment. There are no levers to pull or switches to turn; the control is instinctive and always under the hands of the operator for instant use. Moreover, you can lay your work over the roll while idle, insuring a straight edge and start the work again at your convenience.

Ironing on these machines is done on the same principle as with a flat iron, only instead of passing the iron over the goods, the goods are moved against a stationary iron.

Power and Fuel

Gas, gasoline and electricity are the fuels used to heat the machines. Electricity and hand-power turn them.

Motors come from 1/8 to 1/4 horse power depending on the size of the machine. When buying one, be sure to tell agent whether you have Alternating Current (A. C.) or Direct Current (D. C.) and what voltage

you have. Motors are generally supplied 110, 220 volts D. C. and 60 Cycle 110, or 220 volts A. C. (We are not considering here the belt driven larger sizes.)

About ⅞ of a pint of gasoline is used on the smaller size machine. Sometimes the amount increases to 1½ pints; from about 17 to 33 cubic feet of gas. In the case of electricity as fuel for high heat, 2.5 to 6 kilowatts are used. For medium 1.7 to 4. For low .85 to 2.

The current driving the machine is from 180 to 320 watts per hour.

Size

The household models come 46″, 42″, 37″, 32″ actual ironing widths. The 46″ and 42″ seem to be popular with some manufacturers. The former is for 2½ yards or 90″ wide and 22″ small linen, and the latter for 2¼ yards or 81″ wide or 20″ small linen. The 37″ for 2 yards-wide linen. Size 32″ takes up actually about 42″ × 26″ of floor space, the 37″—47″ × 26″, the 46″—58″ × 25″, etc. There is one ironing machine on the market that is separate from its base so that it can be set up in an apartment on the top of a radiator or on a 14″ shelf. This answers the wants of the "flat dweller."

It is an interesting fact that one agent in New York is shipping 1000 ironing machines daily, many of which go to Boston. This is due to the low rate of electricity that prevails in that city. And here's a point:—even in some vicinities where the rate is low, where two lines only supply a whole state with electricity, it is not advisable to use electricity for machines. You must have a good current, even service, etc., to make it worth while.

How To Operate

You light the burners on these machines as you light the gas, turn the electric switch and iron. It is quite simple and safe. Many of the machines have a pilot light to tell when the current (electric) is on or off. To heat by electricity all you do is to attach the cord to the ordinary wall socket.

A hand-power machine is driven by turning a handle. Thirty-five turns a minute is the right speed. It can be converted any time into a belt-driven machine and attached to the washing machine or anything else that goes by motor.

The saving in health of operator whether wife or servant and the saving of the life of linens, etc., is beyond computation.

The best type of ironer has (1) the stationary ironing shoe under which the felt padded cylinder revolves. This insures evenly distributed heat and avoids the chance of scorching clothes.

In some machines this shoe can be set back in case of accident and prevents the clothes on roller from being burnt. (2) Feed board instead of lever. This gives more rapid control and is more responsive to the touch. (3) Electric switch instead of lever or feed board.

A Few Pertinent Questions And Answers

How long would it take to iron a table cloth by the machine?

About three or four minutes in comparison to twenty-five or thirty by the expert laundress using an electric iron. A saving in current and time.

What about handsome linens with heavy initials?

"The pad on the roller should be plenty soft enough to imbed not only the initials but carry buttons and not break them!"

"What things can't you iron with it?"

"Only fancy waists and skirts. Laces can be beautifully done and, of course, all the table and bed linens, trousers, etc., etc., etc."

"How big are these machines?"

"They come in four different sizes, but the ordinary home can use the 46-inch cylinder or at least as wide as your widest linen to the best advantage. That enables fewer folds and more ironing lay-out on roll, enabling you to put a few napkins on the roll at the same time instead of one."

The Washing Machine

The variety of washing machines on the market today are scheduled in three figures.

The following will give you an idea of the better known types from which to weed out yours.

A. Types

1. Rotary or cylinder.
   In which the wash is put into a perforated cylinder which revolves through the soapy water.
2. Oscillating.
   In which the wash is put into the machine and is washed by being shaken back and forth with enough friction and motion to clean clothes thoroughly. The bottoms of these machines are corrugated or in some shape to offer resistance and cause the necessary friction.
3. Vacuum.
   In which the clothes are put into machine and are washed by the operation of vacuum or suction cups

raised up and down, drawing the water through clothes.

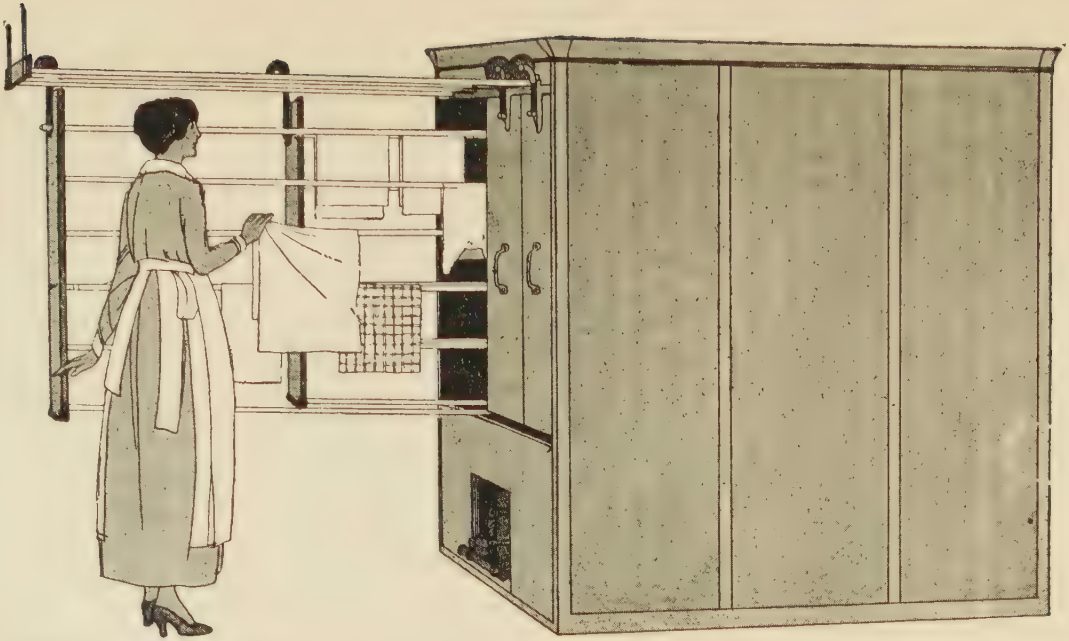
4. Dolly.
   In which clothes are washed by the semi-rotating dolly or device which looks like a milking stool.
5. Combination of these types such as the Dolly and Disc Twin tubs with a mechanism in each, washers with a bench upon which to place wash basket, etc., oscillating cylinder as well as rotating. As to wringers on these machines, they are stationary, swinging or sliding.

The latest type is the alternating. Here the drum rotates, and is divided into two compartments by a perforated plate. The clothing to be washed is divided equally between the two compartments, and the mechanical action of the machine produces alternately the action of the cylinder, oscillating and the vacuum method.

6. A good combination in cylinder, oscillating and vacuum type, has just been added to the market.
7. Balance drum, in which the clothes are put in a drum and it shakes on a pivot.
8. Cylinder type worked by water force—for hotel room use.
9. Vacuum and cylinder types for tub use run by electricity—for houses too small in which to bring a washing machine.

B. General Requirements of Washers

1. All parts which might tear clothes should be covered.
2. All washers, if not stationary, should be equipped with swinging reversible wringer.
3. Hard wood outside or copper or some hard metal and to prevent corrosion in the case of copper exterior, planished tin interiors are the best.
4. Durability.
5. Ease and simplicity of operation.



Courtesy of Scientific Heater Co.

WET DAYS CAN BE DRY DAYS, NO MATTER WHAT THE LAW MAY BE, WITH THE INDOOR DRYER

6. Minimum parts to take out and clean.
7. Less wear and tear on clothes.
8. Automatic release on ringer in case finger is caught.
9. All interiors smooth, non-absorbent of soil or odors.
10. Wash and wring at same time or separately.

Now you have the requirements, you can take your choice after you have gone about comparing and examining all the different types.

Dryers

"What about the dryers?"

They are one of the things that you could get along without if you wanted to waste time in drying. They are expensive to buy, but you are never held up by weather. They dry clothes a good color and you do not miss the sun. They are heated by their own heat, electric or gas or can be attached to the coal stove and get the overflow heat. They are made to allow no heat to escape even when extended. (See illustration.)

Up until late years women not convicts have been time servers. But long before the vote was women's, there was a mighty revolt and women decided it became them better to be time savers and not time servers.

For this reason in gallant fashion manufacturers have rushed to fill the needs of women in their homes and from soaps to ironing machines have they labored and not in vain.

For example, in ancient days if it rained on Monday (then called Moan day) or was Monday humid, the work either had to be given up because drying was impossible or the whole household work had to be dislocated by the transference of wash day to a more sunny occasion, to a day when drying was not a theory but an inevitable accomplishment.

No longer need we say, "If at first you can't succeed,

dry, dry again.'' For the heated air dryer has come for the laundry of the private home as well as for the apartment cellar, and drying has become an indoor sport rather than an outdoor hazard.

These dryers are merely galvanized metal of from two to ten compartments from 46″ to 53″ wide and about 5′ high. The compartments pull out as easily as a watch stem and each drying rack has six drying rods 66′ long or a total of 33′ of rack. Each rack is about 10″ wide. The ordinary length of the rack is 5′ 10″ and the distance from the back of the cabinet to the end of the racks is about 11′ 8″. When the cabinet is closed the track which protrudes overhead can be used to hang clothes on. The overhead track is far more convenient than the floor wheels upon which some racks pull out, as the floor, should it be uneven, will prevent ease of operation of the racks and annoyance will ensue. Single dryers can be bought with two racks only 23″ or so wide for smaller rooms.

These cabinets can be sunk flush in the wall and take up no more room if the building is so constructed or lie against or at right angles to the wall. The heat does not permeate the room in well-made dryers. Any stove used in the laundry should not be in connection with the dryer.

The dryer which really does its work should:

1. Not overheat clothes.
2. Not sweat them.
3. Not turn them yellow.
4. Thoroughly ventilate them.
5. Remove all odors.
6. Dry them rapidly.
7. Make them easy to iron.

Theory and Practice

It has been imagined that sun and wind alone dry clothes but the fact is that air is the drying medium and therefore the best dryers provide a good circulation of air plus heat. Dry air has a tremendous love for moisture and eats it up as a blotter eats up ink. The warmer the air the more moisture it will hug. This would seem enough, just to bake the clothes, but baking does not remove odors and does render them yellow; they are unventilated and smell like the laundry, so people are prone to say "Sun drying or nothing."

However, the best dryers provide for circulation of air. At its best the air changes from 250 to 300 times an hour. The air must change, for after one lot of air holds all the moisture it can, it cannot take any more from the clothes, and new avid air must be substituted for that which is moisture-fed. This is accomplished by a moist air exhaust in the newer dryers, which are larger than the older types. The result is white, odorless, air-swept clothing.

The stream of air is usually accomplished by the use of ordinary chimney draft assisted by the warm products of heating from the heater. The hot air products of combustion pass through a tapered nozzle into the moist air exhaust pipe, and by the speed a suction is created which helps to pull the moist air out of the cabinet and up the chimney.

When you buy a dryer see to it that the exhaust pipe is large so that you will have wind and heat instead of just heat. Air circulation is what you are really buying. See that you get it.

Superficial Points

All parts upon which clothes hang should be non-rusting.

The racks must pull out without any expenditure of strength and must run quietly.

Racks must be within the reach of the average sized woman, to avoid stretching.

The heating burner must be simple and easily reached so that you can tell at a glance how much heat you have turned on.

There must be ample screening so that should a garment fall it cannot possibly get scorched.

The finish of these dryers must be smooth, without protuberances which could in any case tear the garments to be dried.

Dryers are best heated with gas, electricity or kerosene. Care must be given to get the best kerosene burner as they are troublesome when not perfection.

Dryers are simple to operate, and you are saved: (1) tugging clothes to roof or yard; (2) putting up a wash-line; (3) fastening clothes and tearing them with clothes-pins; (4) carrying heavy baskets anywhere; (5) sprinkling and rolling clothes, because you keep them drying only long enough to be ready to iron; (6) the wear and tear from the exposure to dust, sunburn, fading, snow and other outdoor contaminations.

Electricity Or None

A very good little dryer, simple as a broiler, is the over-head slatted dryer, which, on a pulley, is spread with clothes and pulled up to the ceiling where the clothes dry by the risen heat of the room.

In a small kitchen where the washing and cooking is

done, it is a real boon, and in the laundry, too, it is a genuine convenience.

The rack is about 32″ to 64″, and on the ceiling it is comfortable and useful and out of the way. It comes in two sizes.

Your clothes go directly from the wringer to the rack as in the big dryers, you obviate unnecessary handling, clothes-pin destruction, etc.

It can be pulled down to your own level and hitched on a wall pin so as to make it reliably firm while you load it.

Tables and Shelves

Shelves in a laundry are very much more useful that a quarter of a dozen tables or to buy two or three tables for laundries and abandon them for needed foot room, yet long for some room to put things on.

The steel unit of shelves is a very convenient way out. By using a continuous running shelf, like an amplified plate rail, any place in the laundry can be a handy one for placing a bit of soap, a clothes-pin, washing powder, clothing waiting for starching, or any other thing. Steps could be saved and wit conserved.

Tables are a necessity, especially the large 7′ table or smaller. The wooden one for a laundry is quite useful and so also is the all-metal table. But too many tables spoil the temper, and the shelf is a comfort.

They should be from 31 to 38 inches high, if possible adjustable. The tops are most satisfactory in a non-porous porcelain or porcelain enamel. Some people like hard wood or metal.

Ironing Boards

There are many varieties of ironing boards on the market. Some fold back against the wall and some do not. Some fold back in self closets against the wall. Some are adjustable to different heights, others are not. They come in various sizes and finishes and do away with the falling and slipping ironing board which has caused so many useless burns.

In large houses the valets have tables such as you can purchase with sleeve boards, swinging bodyguard, supply cabinet for cleaning fluids and brushes, and with electric iron equipment, snap switches and automatic signal pilot lamps for each iron. These tables are made of seasoned pine painted white. Legs, underbody, cabinet, brackets and cord supporters are in silver bronze paint. The boards are covered with the best quality felt. Unbleached muslin makes a good covering for any ironing board and is generally used.

The ironing board is indispensable for fancy things, even when the ironing machine is regularly used.

A Burning Shame

When un-electric irons are used, there should be an ample supply of iron holders. If your irons are not of the removable insulated handle type, iron holders of ticking or soft bits of carpet can be used. This sounds very elementary, but many scorchings would not have taken place had the laundress not rushed to get through to save the hurting hand.

This is truly a burning shame if anything could so be called. It is possible, too, to get a thin bit of asbestos encased in a bit of ticking and so protect the laundress from discomfort and your clothing from destruction.

These iron holders could be made by the children of the house who are always looking for something that they can make to give to Mother, Auntie or Grandma.

The Laundry Chute

Much time could be saved in the laundry if whenever it were possible a chute could be built into which clothes can be thrown and go directly to the laundry where is situated a basket or a terminal closet to receive them. Here stuffing the dumb waiter is obviated, also carrying the clothes in baskets down the lift or just using the ugly clothes hamper in dressing room or bath room. Here is a more or less suggestive plan of arrangement.

Arrangement

Assuring less expenditure in labor and money.

1. Soiled linen chute in one corner of the room.
2. A table near to sort laundry before washing.
3. Tubs in center of the room to be accessible.
4. After clothes are washed and blued they can be partially dried in dryer and ironed.
5. Then a table on which to place clothes to be ironed.
6. Ironer next in the best light possible and arranged away from wall to permit two people working at it, if necessary.
7. Skirt and sleeve board next.
8. After which another skirt and sleeve board or a valet table or another plain table.

Some people keep a sewing table in the laundry but it is easier to have the sewing done in the sewing room and away from the laundry work. Because the different maids might much better stay in their own territory and failing maids its easier to keep your threads any place but *in* a laundry.

Flat Irons

Because there are some dainty things that cannot be put through a machine, electric flatirons are absolutely indispensable in a laundry. For that reason there are many kinds on the market. They are usually made from 2½ lbs. to 15 lbs. Most have but one heat, but some have three heats. A traveler will be pleased with the adjustable 3 lb. iron which has a voltage adjustment making it practical with 220 or 110 voltage.

Soaps And Powders

With the best washing machines you get bad results if you do not use good soaps or cleaning powders.

There is a very good powder on the market which not only cleans the clothes well, and leaves no greasy residue, but is really not a soap at all. It combines rapidly with water, and makes a fine suds and cleans very rapidly.

For the most part to-day, yellow soaps and white soaps as cleaners are on a par but are not as good for laundry purposes, since the resin in the yellow soap combines unhappily with your clothes.

White soaps are best, if you want good results.

Another delightful new thing on the market is the starch which does not starch but which imparts a gloss and resistance without a stiffness. This will come as a boon to many women who do not want their lingeries stiff but do want it to look as a starched bit of linen does. In the same way as starch this composition permits the lingerie to stand up longer under use.

The foregoing is just a group of ideas in concrete form to add to the comfort of laundry days. They can

be passed on to friends as ideas, even ideals, or as practical, concrete gifts.

All three or any would be acceptable to the thinking housekeeper who wants one hundred and one things done better than a man can do one thing well. So all aids in the home are worth not only considering but investigating with eye and ear as well as heart and soul.

To Avoid Blow-Outs

Perhaps more money is wasted on blow-outs in homes that utilize electricity than any other cause. If you follow the rules, illustrated here and first published by the Edison Company, not only will you save expense in the home, but you will save the Fire Department, which is constantly called upon to save lives and property because of unnecessary fires due to carelessness (Not to electricity) in handling flat irons.

The cardinal principle for the use of all electrical appliances is this: When you are not continuously using any device, shut off the current. To do this, entirely disconnect the flatiron, curling iron or whatever the device may be, by pulling out the plug. Do not be content with turning off the current at the lamp socket. It is absolutely necessary that the current be completely cut off when the iron is not in constant use. Sometimes the current has been inadvertently turned on when the flatiron has been left connected at the lamp socket, and material has been badly scorched or even more serious damage has resulted. An electric coil for heating water has caused fire when carelessly left near inflammable material. In like manner a connected curling iron when heedlessly placed on a bureau scarf has also caused damage. Remember the invariable rule for the use of all electrical appliances—pull out the plug to disconnect when not using.

L' Envoie

Go to the best dealer.

Buy the best only; it reduces later costs.

Simplicity, safety and serviceability necessary.

Avoid machinery with extra parts to be cleaned or upon which injury to attendant or clothes can be perpetrated.

Don't buy until you are perfectly sure by numerous comparisons and other experience what are the best types of machinery to install. Be sure to apply the three S tests: Service, Safety, Simplicity.

CHAPTER IV

THE PORTABLE VACUUM CLEANER

"I HAVE seen ten vacuum cleaners at the Electrical Show and every one, according to the salesman, is the best on the market! I want one, but which one shall I buy? It's most confusing!"

This was said to me no less than ten times.

The answer is: that you must find out in the same way as you found out about your motor car before buying it. You didn't buy your car because a salesman said it was a good car and because he made you sign a slip and because he promised you, as he departed, a quick delivery.

No, indeed, you tried out the car first or last and you asked your friends, who had purchased the same make, how they liked it and you talked a lot about cost of upkeep, efficiency, wear and economy and the service possible to be had from the makers. Didn't you? Well, the same process is necessary in buying a vacuum cleaner or any other piece of machinery for the house and every Domiologist knows this to be a fact.

"All Is Not Gold, Etc."

All vacuum cleaners look charming and shiny and all seem very perfect in the shop! And they all do their stunts beautifully as the skilled operator thrillingly draws designs in the flour or bi-carbonate (clean, unclinging dirt) on the patient carpet. The operator

talks glibly, often failing to give the failings of his machine because he doesn't know them. So the only thing to do is to try it, in your own home, under your own special conditions, and see that it gets under your furniture, removes threads, lint, hair, dust, matches and other substances with the least possible noise (for noise wears on the operator's nerves and raises a dislike for the cleaner) and the least possible effort.

It must be light weight, easy to operate and economical and durable. There is nothing so hard to remove as "natural born dust." It becomes imbedded in the carpet and it takes force to remove it and the sort of force that will not destroy.

Taking up the differences in the various machines, it is the better part of valor to know what the nature of our prey is before we start to hunt! So we will examine the animal dust in its hunting-grounds.

Dust's Hunting Grounds

In your home you have on the floor woolen or grass fabrics; rugs large and small, and carpets, grass rugs and mattings. The carpets or rugs may have a long nap loosely woven (Chinese) Axminster, Wilton, Velvet Chenille or the pile in loops (Brussels) or just woven threads such as ingrain without any nap or pile. Grass rugs (Crex, etc.) and matting are of this kind.

It is easily understood that, as the carpet or flooring is walked on, the dust becomes deeply imbedded and gets tangled up in the fibres, and that surface sweeping never can take out the dust and you have to send carpets each year to the cleaners to restore their color, etc.

Above the floors are, of course, the hangings, mattresses, books, pictures, moldings, ceilings and walls.

As to the dust and the litter, such as matches, hair, lint, collects, 85%-90% of it gathers on the floor, and 10%-15% in the rest of the room. Therefore the cleaning is reduced on the upper regions if the floor is kept really clean.

Of all dirt considering the surface dust not walked on that blows in on clothing, etc., litter, threads, hair, lint, and pieces of paper, imbedded dirt, grit tracked in and entangling itself in the carpet, the worst of these, of course, is the hair and lint and grit. These are hard to remove but they must be taken out, especially the grit, which is the destructive agent in dirt. In the Oriental regions, where the street shoes are left on the door-step, the vacuum cleaner might seem useless.

The carpet doesn't wear out so much from the top as it does by being cut from the roots by the stamping in of the cutting grit. Therefore, the vacuum cleaner has been invented to save the carpet, and not only to destroy the carpet destroying factors, but to annihilate the microbe drawn into the house from the street on your offending shoes.

We Are Three Kinds!

And so . . . to have the cleaner that really functions, every machine must be constructed so that it can be easily taken apart and adjusted, and in order to know how to know whether the machine is useful, the following resumé of the kind of cleaners may be of service. These will be treated in functioning classes rather than in technical terminologies.

The portable cleaner (we will not discuss the installed types) are divisible into three classes:

1. Using air only as a cleaning agent
2. Using air plus a brush
3. Using air plus beating and sweeping brush

First: In this class are the tank machines having vacuum pumps as well as fans, single or multiple (many fans mounted on the motor shaft) and the small fan portables.

All these machines are on the same principle, having the motor, fans or pumps for moving the air, a dust bag to collect the dirt, and the hose in the tank machines' case and the extra tools.

In the small portable machines, which we are considering, the narrow slatted tool attached directly to the motor and the fan case is the medium through which the dust from the floor is taken up and the hose, as in the tank type of cleaner, is eliminated for floor work and is only used for altitude cleaning. So the only difference in these types—the tank and the slatted portables—is that the tool for the floor work is directly on the motor case, in the slatted or fan portables, and on the end of the hose in the tank types. In some machines the dust bag is before the fan, in some behind it, in some the bag is enclosed (there are hardly any on the market now) and in others it is hung on the handle. [Wherever the bag is, it must be so made that it does not slip from its mooring and spill.] The principle, however, is the same in each case: drawing air through the tool which slides easily over the carpet, plus the velocity of the air as the instrument upon which the cleaning is dependent. Upon the rapidity and frequency of the passing of this machine over the carpet depends the thoroughness of the cleaning operation.

When the carrier wheels are on either side of the nozzle or just back of it, keeping the nozzle slightly above the carpet, the operator, if skilful, can do a good job.

Second: Using air plus a brush: The brushes are used as follows:—(1) Straight bristle brush (looks

like a comb of bristles) attached inside or outside of nozzle, projecting slightly below it so that it will comb the carpet. (2) Spirally wound bristle brush fitted inside the nozzle opening and operated by the carrier wheels, either with a belt or gears. This brush moves in the opposite direction to that in which the cleaner is pushed, and takes up the lint and hair, etc.

As To Motive Power

Motor driven brushes are driven by a belt attached to the motor. It is continually in action when the motor is running except, of course, when the brush is removed for any reason. The surface is continuously swept as the air passes through the nozzle, and there is, of course, more power in the motor driven brush. But its enemies in the friction brush camp aver strongly that the brush is prone by its velocity to wear the carpet! These brushes generally have two rows of spirally wound bristle, and in this type you get away from the old-time carpet sweeper where lint and threads adhere for a long time to the bristles and often return again to the carpet.

Third: Using air with beating and sweeping. These sweepers have a large brush in a large nozzle and the brushes are spirally wound in two rows with a simple belt connection to the motor. These machines are generally adjusted so that the nozzle is about ¼″ above the carpet. The bristles extend enough below the nozzle so that the bristles push away the carpet as the air draws it up. This gives the shaking motion at the same time the bristles, coming down at an angle on the carpet, beat it and passing through the nap comb and sweep it automatically. The bristles comb the nap and the air, passing through, cleans the carpet and the imbedded dirt is loosened by the shaking. The

surface litter and hair is swept up and it cleans efficiently by applying all the laws of cleaning at the same time.

Of course, with the cleaner come tools for altitude cleaning, for blowing out dust from books, moldings, upholstery tuftings, etc., etc. The extra tools are absolutely necessary and it is well to remember that the price is generally given you without the extra $7 to $10 being added. Tools are made of aluminum steel and fibre, which means that they are durable and will withstand much wear and tear.

If you should own the best vacuum cleaner in the world and take no care of it, it would be as if you had none. Every bit of machinery that was ever or will ever be made needs care. Any mechanism "acts up" if neglected. It is true, that the vacuum cleaner needs very little care, probably oiling once a month and the removal of the dust after every cleaning operation. The oiling is easy to understand, but the reason for removing the dust after every operation is: that, if the dust bags clog up, the egress of the air is impeded, and therefore the action of the motor is impeded, and the fan's speed is diminished, causing a decrease in velocity and air supply which is what makes the cleaner more useful than a broom.

Do not be fooled by big talk and glib printed matter about high vacuum power, and long air and water columns. What is needed for a good cleaner is air displacement at a sufficiently concentrated point or surface to maintain a high air velocity. A vacuum cleaner might show in a technical test a tremendous vacuum and when used on the carpet the nozzle be so constructed as to mitigate the power of the suction so created and, therefore, be ineffectual as a cleaner. Therefore, the salesman can talk glibly to the uninformed about

vacuums and tests and never say "but our nozzle is so large or so high or so low that the air intake is bad."

Too much vacuum often makes the machine heavy by sucking too heavily upon the carpets. Of course, raising the nozzle here will help this fault.

Motors!

Another battling point is the question of whether the motor put in horizontally into the casting or that which is put in vertically is the better. They all talk glibly on this subject, but heed it not. All that is necessary for the purchaser of a cleaner to know about the motor is that it should be made by a reputable firm, have a good speed that is spectacular and that it be not imbedded too deeply in unnecessary fixings to be oiled and cleaned.

The universal motor is best for the average purchaser as it works well on indirect or direct current, whichever is supplied to you in your neighborhood. Nearly every cleaner employs a universal motor.

Every vacuum cleaner manufacturer has some point of his own that makes him the most delightful of talkers. Here are some very useful devices which are worthy of mention, but for the most part are matters for individual choice:

The enclosed dust bag.
Steel motor case.
Nickled steel motor case.
Aluminum motor case.
Wheel bearings inside the nozzle.
Wheel bearings outside the nozzle.
Detachable nozzle.
Air cooled motor (most motors are cooled by in and outgoing air).

Dust bag on top of the handle shaft.
Adjustment with nut for stair cleaning.
Self adjustment to keep handle erect when released from holding (very convenient).
Automatic current cut off.
Extra roomy hooks for electric cord on the handle.
Oil cups protected from dust (should be always).
And general attachments made as simple as possible.
Dust bag lined and sometimes partitioned.
Dust bag easy to put on and take off with a collar to hold between the soles of shoes to empty without making dust escape.
Automatic closing valve where dust bag collar comes off—to prevent dust flying back into motor casing.
Rubber bumper to protect furniture.

Requisite Qualities

In short, the satisfactory cleaner must:

1. Sweep loose the adhering dirt such as thread, lint, dust particle, and brush up matted nap or pile to restore color tone.

2. Loosen and shake to the surface ground-in dirt that kills rugs and carpets, so that it can be removed.

3. Have suction enough to carry away all dirt after the soft hair brush loosens it to make it possible.

This is about the whole story. And as to the expense of operation, they cost not even as much as an electric iron, and far less than the cost of extra cleaning folk to-day. Cleaning becomes interesting and the household without a maid or with one, saves time and money. The rugs can be cleaned at home and stored at home in the summer. Here you save summer's many costs! Cleaning becomes almost a pleasure, at least a pleasanter performance, not a bug-bear—or in this case we might say —a rug-bear! It is an economy, a comfort and a gold

lined investment in which the interest is health, money saved, and fabrics preserved. Could you ask for more in a sweeper?

But don't expect miracles. The vacuum cleaner needs slight pushing over the floor—it can't roll by itself.

CHAPTER V

A PIPE DREAM

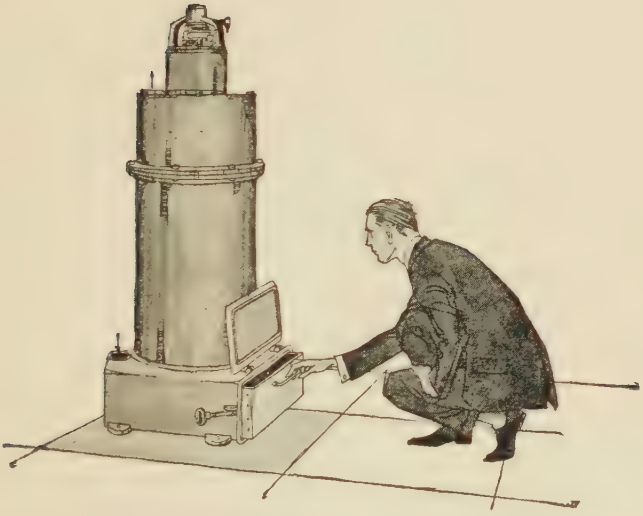
AS soon as you get accustomed to the intricacies of one method of doing anything to-day, something new crops up. This is probably more true in the realm of housekeeping than in any other except that of military science. You have no sooner mastered the points of what not to do and what you should do with portable vacuum cleaners than up comes the stationary vacuum cleaner and you have to know about it, too. And so this article after one on the portable cleaner. If you forget the technicalities see Chapter IV.

To refresh your memory, every vacuum cleaner has five elements:

1. Air producer (vacuum is a misnomer): the pump or fan series employed to create the air current.
2. Dust collector: bag, box, pail, etc.
3. Dust conduit: piping.
4. Cleaning tool: brush, felt, etc., etc.
5. Human direction: the hand that steers.

The portable type of cleaner has the first four parts mounted on one unit, so that the whole machine is moved in its chase for the enemy Dust. Besides this the electric wire must be applied to an electric connection in a baseboard or electric fixture.

In the case of the stationary cleaner, the mechanism is larger and the air producer and dust collector are in the cellar or basement, and the dust conduit impartially spreads itself throughout the house through walls and ceilings and politely connects at convenient inter-



Courtesy of American Radiator Co

LOOKING FOR THE DUST WHICH WAS SUCKED DOWN FROM ABOVE STAIRS!

vals with the cleaning tool, via the agency of the vents in baseboards. With this cleaner the only thing that is manipulated by the worker is the cleaning tool which "bites the dust."

Pros and Cons

But why should you have the installed cleaner? Why not have the portable? The fact is that neither of these cleaners is in competition very directly. But let us quote an expert who has given most of his time to the subject of air cleaning:

"There is unquestionably a legitimate field for both types of cleaners, but the stationary type more nearly reaches the ideal." The next statement of his will explain that: "If we observe the action of the wind in an open field, we find that a gentle breeze will move light material. . . . If the breeze changes to a hurricane, we find that the moving air has the power . . . to move anything in its path, including fences, trees, houses, etc."

Therefore in considering purchasing a cleaner you must ask yourself first: "Do I want a gentle breeze or a little hurricane in my home? That's the first and foremost question! Is my home large enough to afford the much more expensive plant which makes the hurricane, at a higher running cost; or isn't the portable just the thing I need because of its various adaptabilities and small running and installation costs?

It has been held against the installed vacuum cleaner that it is—

1. Expensive.
2. Unusual skill must be employed in installation.
3. Suction is altered by length of pipe.
4. Cost of operation is high.
5. Wear and tear on the house too great.

6. It must be installed when the house is built.

Of course the stationary type is more expensive than the portables, because of the larger machine, the indefinitely long pipe system and the larger motor. The motor has from six to twelve times and upwards the horsepower of the portable machine. It is, therefore, more costly to run because it eats up more electricity, but it can do heavier work and quicker.

Great skill must be employed in the installation of all machinery. Not long ago mistakes were made when putting in the air system, but now engineers know this department of work as well as they know gas and electric installations, and with the length of hose used there is no lessening of suction because of the construction of the entire pipeage.

The objection that with this apparatus there is tremendous wear and tear because the hose is taken through the doorway from the hall so that the door must needs be scratched when it closes on the hose as it is dragged through, may be nullified by installing double end hose connections in the wall near the door so that one line of hose will connect from the valve to the connection in the hall and another shorter piece of hose used inside of the room.

There is no trouble at all about installing the stationary vacuum cleaner after the building is erected, but naturally it is less expensive to put it in during the building and when planned for ahead than it is to put pipes through a house after it is built.

Operation

With the stationary type cleaner you have no machine to move about—you simply move the tool attached to the hose and the tools are just as light as those of the portable machines, There is no electric connection to make,

no electric wire to carry unconsciously along. All there is to be done by the worker is to slip the end of the cleaner hose into the suction pipe opening in the baseboard of the room. A patented device prevents the hose from becoming detached accidentally.

The usual tools come with the installed cleaner, such as handle, blower, felted sweeper, book cleaner, duster, etc. Other tools can be made to order to fit any particular need.

One thing delightfully obviated in the stationary cleaner is the noise. The writer has what she considers the best portable cleaner on the market, yet the noise is a great drawback. The stationary cleaner is therefore a boon to the sick room and it is easy to see why the newer hospitals take as readily to them as to the piped water system.

Then, too, having the baseboard vent in each area in large houses, with the consequent needlessness of carrying a cleaner upstairs and down, over hill and dale, is a selling point for the piped cleaner. Also the swiftness of the cleaning, due of course to the tremendous air velocity—a canned hurricane. However, in the small residence the greater cost would be unwarranted because of the great efficiency of the portable machines.

Where there is a garage in the family, and it is piped for cleaning, the machinery, instead of being permanently installed, can be mounted on rollers and can be wheeled and attached to the pipes in that building. Therefore the necessity of two machines is obviated where the other building is piped.

Yet when the buildings are widely separated it is best to have one of the good portable machines which are on the market in so many designs, and are adapted to so many and varied uses. Therefore you see the portables

as indispensable and see them filling fields that the installed can never hope to fill.

The fact that the stationary entails no dust-bag cleaning is a time and labor-saving actuality. Then, too, no matter how good the dust bag is on the portable vacuum cleaner, some of the very fine dust must escape through the bag into the room. In the stationary type the cleaner politely does its exhaling in the cellar. This point has been made valuable to chocolate makers who want to save the loss of chocolate in packing boxes, to manufacturers who want to obviate the retaining of poisonous dust among the workers, etc., etc.

In the stationary as well as in the portable vacuum cleaners the suction is caused by the pump or fan type machine. Some manufacturers advocate one, some another. In picking your winner you must go to the best manufacturer of each type and let him give you his tale, and then see whether you come out a pump fan or a fan fan!

The other intricacies of this simple machine need not bother you. Go to the best makers and make them responsible for your purchase. Not all of us being engineers, you have to depend on the reputation of the best makers.

The stationary cleaner can do more work than the portable, it will last longer because the machinery is heavier, yet there are drawbacks to it as to all machinery which is not at all points open to the eye. For example, the pipes may clog. But you must remember that water pipes can clog and that gas pipes do very exasperating things; yet you use them without blinking.

For the very large residence, factory, hospital, hotel and institution, of course the stationary machine is best, mainly because it is difficult to get help to-day to carry about the premises anything that is heavy. To lift,

push or carry the lightest portable over a very large residence or institution is a trial, and the stationary type overcomes this difficulty.

In some cases the heavy duty portable is advised with its increased horsepower, but when the purse and area of residence match, the stationary type is really the best, although we know householders who prefer to use the portable and heavy duty portables everywhere.

The stationary plant is only another real "pipe dream" come true, and in addition to piped water, piped gas and conduited electricity it will tend to hasten the processes of home maintenance and free the homekeepers to do more spiritual home tending.

But remember that in the average home or apartment the portable machine is the ideal sweeper and fulfills more than every requirement of sanitary sweeping combined with the least effort. The stationary is for the large house, not the small.

CHAPTER VI

COOKING BY ELECTRIC CURRENT

THE electric stove is the most dependent on geography of all your kitchen implements. Because it consumes a large amount of electricity, the rate of this as a fuel will decide whether or not you can use the electricity-consuming stove. This decision, in turn, is affected by the rate of electricity for cooking in every different locality in the country.

The vogue of the electric stove is due to the convenience and sureness with which the cooking is done, the control which may be exercised and the positiveness of results. Furthermore, the cleanliness, lack of odors and gases, and the easy installation and convenience of placing are other important reasons why the electric stove has come to stay, if electric companies cooperate with the stove companies to give a cooking rate.

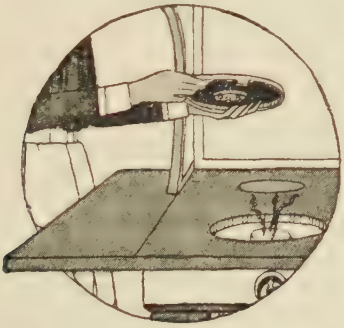
It's vogue, too, is largely due from the fact that in the maidless home housekeepers find electricity simpler, cooler and cleaner, if more expensive and not quite as rapid as gas.

Points About the Stoves

As with the gas and wood stove, the main principals must apply in picking them out, with but few additions and omissions. The electric stove is not bothered with its own deterioration by the combustion inside it of oils, woods, coals, cokes, etc., but has, of course, to

Courtesy of Estate Stove Co.

THREE LITTLE FINGERS FIT IN THREE LITTLE HOLES AND THE CONNECTION IS MADE



Courtesy of Bramhall Deane Co.

HERE THE STOVE LID IS SET ON A LITTLE ROUND PLATFORM ALREADY ATTACHED AND EASILY DISENGAGED

ELECTRIC RANGE

be well wired, rust protected and insulated against mishap and fire. Accidents are contingent on anything that uses any fuel. With electric stoves it is unnecessary to have large or small storage systems, which makes electricity a convenient fuel for the small "rabbit hutches," in which the wealthiest and poorest are forced to live in these days of homelessness.

Then again, if you employ electricity, whether it is more costly or not, you do not have to put in so strenuous a flue system when building a house, but just a hood over the stove as a vent to carry off cooking odors and a special wiring system. You do away, too, with the draughts necessary for coal or wood types and all the contingent engineering niceties, which harass and wear you if they are not perfection.

The body of the stove should be built of non-rusting iron. Armco rust-resisting iron is often used in the best grades of stoves. It is free from impurities which invite corrosion and rust and has proved a valuable material out of which to make a good stove body. On some stoves the tops are made of gray iron castings which, with the black body and its polished iron trimmings, make a very stately and harmonious article without sacrificing anything of practical utility.

The top of any stove is the place upon which are placed the utensils for frying, boiling, etc. This is true whether the fuel be coal, gas, electricity or what-not.

The top of the electric stove is no variant to this rule. It has the spots upon which to place the utensil and these spots are called the heating units. Heat, of course, is communicated in varying degrees between the units. These units are of cast or wrought iron. The tops of any electric stove must be of cast iron or some such non-warping rigid material which takes readily to cleaning. The heating element should be safe from

molestations and the top of the stove must be smoothness itself to hold the utensils with perfect ease and steadiness. The units' wire connection must be enclosed to protect the heating element. The top of the usual electric stove has about four cooking "holes" or plates, or heating elements. In some cases the electric connection is made by the heating units being equipped with pluglike sets or fingers (as your ordinary lamp plug) and fitting into a socket under itself. In other cases, if it be a three-heat stove, the three wires are directly connected with the heating element and all that has to be done in case of bad connection is to raise the heating element and unscrew the wires. In other styles when bad connection occurs you must search the surface beneath the plug, a little more complicated operation, but still the manufacturers of this feel that it is an added protection to wiring.

The surface units, too, must come off easily so that no extra tool is needed to pick them up.

Ovens and Broilers

There are two kinds of ovens used in the electric stove, from the point of view of heat retention. One of them does not retain the heat completely enough to call itself a fireless cooker oven yet does retain heat to a great degree and cooks well after a little time on the third heat or low heat. The other style guarantees a fireless system of cooking when the electricity is cut off.

Strange as it may seem, the largest and most elaborate and the most expensive stoves are not made with the retention-heat method because, no doubt, the persons that can pay about $1000 or even $700 for a stove have chefs and don't really care whether they use more or less electricity.

For ordinary use, however, and for the large stove which costs to-day around $140 to $225, it is well to have the retained-heat oven, the oven so insulated as to keep in the heat and keep out the cold, so that you can cook easily by fireless and save much electricity.

The oven should be equipped with top and floor heating units. These should be controlled by a three-heat switch and so geared and wired as to be accessible. If one unit burns out the others will not.

In some stoves the heating unit in the top of the bake oven is controlled by the same switch which operates the units in the oven bottom and is of proper intensity to insure good results.

Often this same unit also serves the broiler. In other cases the broiler is supplied by an "on and off" switch alone and it is only made in conjunction with the broiler. In still other stoves the three-heat broiler with separate switch is employed.

The broiler must be heavily tinned to prevent rust and corrosion and it must have a removable drip pan. In one stove on the market, which has the broiler to the left on the top, the drip pan is fastened to the broiler so that when it is drawn out over the stove for any reason the drippings are caught by the pan and not spattered on the stove top beneath. This is a minor perfection but a very nice one.

Some range companies make a unit of a certain size, say "24" or "48," and if you want a larger size you can simply say "I want two units"—or three, or what not. There are small stoves for yachts and kitchenettes; in fact, the electric stove is as adaptable as a telescope, some have ovens above, some have ovens below, some have broilers above, some below. Some have everything above, some everything below. You can have exactly what you want as to price and style.

Some stoves are also equipped with practical plate and food warmers.

One very pleasing stove is called a period stove because it has legs that curve and cavort like a period bit of furniture—what period we couldn't say unless it be early Edison.

Then, too, there are combination coal and electric ranges, for there are those persons who must have both—and as they are beautifully combined they make a neat and effective unit in the kitchen.

There are portable stoves and stoves that are built-in; that is, the stove that can be very simply moved from place to place if necessary, and the one that is backed into the wall and would leave a scar if it were moved. Of course the huge stoves are of the built-in type, but they, too, come with legs and are better adapted to removal.

Electric Measurements

For these electric stoves, special wiring must be effected. They cannot be attached to the ordinary electric socket. It is necessary when ordering a stove to give the voltage of your electric supply. The stoves are usually prepared for 110 volts with two-wire service from street or 110-220 volts with three-wire service. In some stoves the cut-out box is built on the range directly back of the switches. This, then, can be easily opened if anything happens. In the stock stove an extra charge is made for voltage exceeding 220 or less than 110, because alterations have to be made.

The consumption of watts in the electric stove is a very vital question. Watts are the unit of electric power, just as you speak of 50 cubic feet of gas in measuring gas consumption. The unit of figuring the cost is not on the watt—because a watt is too small a figure out of

the unit of one thousand watts, which is the kilowatt. So you call the unit of fuel consumption the kilowatt hour and you say the average stove consumes about one kilowatt hour per person per day. If a burner consumes 800 watts it means you will be charged 800/1000 of a kilowatt per hour.

According to the size of heating elements, the wattage of stoves runs from 10,000 watts or 10 kilowatts (which is the same thing) to about 2500 watts, or 2½ kilowatts on a small three-heating-unit range. This gives its total capacity if everything goes at once.

It is a little more intelligent for the housewife to read her meter than not to. So here is how it is done: There are four little dials, which you read from right to left, the opposite manner of reading this page. The first dial measures the tens, the second the hundreds, the third the thousands, the fourth the ten thousands. Therefore, the total is found by adding all the figures at which the dials point and always reading the lowest number which the dial approximates. But you must always substract your last month's record from this, of course, to get this month's average; and this amount multiplied by your electricity rate would give you what your bill should be.

After all, the cost is the paramount thing in your purchasing and calculations as to purchasing. The electric stove is, on the whole, more expensive than the ordinary cook stove. The fuel cost varies, as has been said before, with the locality in which you happen to live.

In many places the electric companies have made a cooking rate much lower than the lighting rate. In such localities where the electricity is but from 1½ to 2 cents, the electricity as fuel is almost equal in cost to gas at one dollar. It has been generally admitted that, with care as to fuel consumption, a kilowatt hour

per day is consumed by each individual in the house. If you have to pay three cents per kilowatt hour and you have six persons in the house, your electricity will cost you about eighteen cents per day. In the large, weighty and "watty" stoves the consumption of electricity is about 2 kilowatt-hours per day per person, but on the stock ranges not weighing over 300 pounds with a comparative low wattage (compared with the 1200-pound made-to-order range) the average is, as was said before, but one kilowatt-hour per person per day. One firm, computing 4.2 persons to average a family, states that in the use of 26,180 ranges the cost was $4.06¼ per month per family.

The value of electric cooking is not in the low cost of fuel but in the saving of labor, food conservation, cleanliness, comfort and mental or pyschological delight in the shipshape and orderly method.

In cities where the cooking rate is the same as the lighting rate (around seven cents) cooking by electricity is expensive for the average folk who have to think a little about the cost of living.

It has been said that electric cooking is expensive because it takes longer to cook by it than by gas. This is being overcome in three ways: first, by the proper use of electricity and the turning it off and cooking on retained heat; secondly, by the better made stove in use to-day: thirdly, by the use of proper sized and shaped utensils which are a very great factor in the rapidity of cooking and thence economy of electricity as a fuel.

Control and Trimmings

Most stoves are equipped with reliable thermometers and also many give charts with the stove to show you

exactly what temperatures on that particular stove will accomplish the pop-over, the roast, or the what-not. This eliminates any basis of error. Some, too, have glass ovens which further add to the gaiety of rations.

In buying, buy of the best firms, get guarantees, see that your wiring is adequate and that everything is well insulated with asbestos or something of equal value.

See to it that your oven doors close without slamming; that when they are open they won't bend if a weight is put on them. We have seen one stove stand the weight of a man jumping on the stove oven door when it was lowered. Many a good cake has been ruined by banging oven doors.

The switches should be conveniently placed and not off in some corner. The fuses should be back-side or back of range, as they are not particularly beautiful to gaze upon and one is apt to take them for switches when rushed. But few stoves now put the fuses in the front. The fuses should be so connected that if one blows out all do not.

There is a stove on the market at present that has a fireless cooking timing device, so that when you go to bed, you can have your breakfast all cooked for you (if you have stocked the stove before retiring) at any time in the morning at which you have set the clock. This you may consider a trimming, but it is a nice bit of modern life's embroidery.

In most of the stoves the fireless cooking saves time and saves your food. Basting is unnecessary; you get what you pay for in weight of the roast and lose less than by any other process of cookery. In some stoves twelve or fifteen minutes of electricity are all that is needed; stored heat then does the work.

Dimensions and Care

The heights in stoves vary from a few inches (table ranges) to about 5′. Height to cooking top varies, too; the nearest it comes to 38″ the more comfortable, of course. The new stoves are being made with special emphasis on the height of cooking surfaces.

The depth of stoves also varies, from the built-to-order stove which is 33″ to the stock stoves which run even as narrow as 16″, with but three top cooking or heating units instead of the average four.

As with all new devices, you must practise with the electric stove to get the best results. The first few weeks you may think you are using too much current. You will be, too, but you will learn better if you take the following into your mind:

1. Do not overheat your oven. Never let the temperature exceed the thermometer's tell-tale face.

2. Oil your oven occasionally as you would your typewriter or sewing-machine, for some "non-rusting" ovens go back on you.

3. Not only engineers but cooks often sleep at the switch. But you mustn't. It would be wise to have a master switch in the kitchen connecting the range to the electric supply. In this case you can turn off the electricity and there will be no danger of leaving a burner turned on when not needed. The heating plate may crack if the current is turned on without anything cooking in a utensil on top of it.

4. Don't remove burners unless repair is necessary. Boiling over of foods won't hurt the burners. Use nothing but a light non-metallic brush to rid the burners of spillings. If you use old utensils that have become rich in food deposits, thoroughly scour be-

fore using on the electric stove. The electric stove makes no deposit on utensils.

5. Turn down the burner when water boils. You have three heats. Turn from high to low at boil. Your bills will come down 75%. Use as little water as possible and by keeping the lids on you will cook by steam. Turn your switches to low at every chance you get. Ten or fifteen minutes before the food is cooked you can turn off current; there will be enough heat to cook with if your utensil is covered.

6. When cooking roasts, in about an hour, depending on the size of your roast, you can turn off full current on the top burner and cook on retained heat or on medium heat of bottom burner.

7. For safety in expense keep one burner on at Full. Start your cookery of each thing on Full and then shift to medium burners. This will save electric bills, as you won't have all your burners going full tilt at the same time.

8. Flat bottom utensils at least as large as the heating space are necessary to the economical use of the electric stove. Use as little water as possible, thereby cooking by steam and saving food. Shallow vessels take less heat and therefore less electricity.

A Very New Departure

On the market, as this goes to press has come the electric stove which, instead of heating by radiant heat (red), cooks by conductivity or black heat. That is, the unit becomes hot throughout and does not burn by becoming red hot. It is claimed in this case that the unit wears longer and that it takes less time to cook therefore less electricity. We have not had time to test this stove so cannot vouch for it except that it is

made by very eminent manufacturers and invented by a very distinguished expert.

It is so built that the cleaning of it and the replacing of its parts is done with the minimum effort.

All switches and connections are at the back of the stove and can therefore be kept inviolate.

The top burner elements are made of multiple low temperature units from one ampere in a single unit to almost unlimited amperage of say 25 amperes, from 25 single units in parallel within a square or diameter of 8 or 9 inches. Think what flexibility of heat this means! It is just what up to date the electric stove has lacked with its but one to three "heats." If one or more units burn out then there are others left!

The stove is so geared that a fluctuation of 25 volts will make no trouble!

The oven arrangement and unit system is so arranged as to bake quicker and adjustable to different size pans.

Ideal broiling is a thing quite boasted of in this stove.

All the units and parts are easily removable for cleaning so you will get a prize if all the things they say of their stove are true and we have little doubt that they are true.

Courtesy of Brainhall Leane Co.

HOOD AND STOVE HEATED BY GAS AND WOOD. NOTE THE MARBLE-TOPPED TABLES

CHAPTER VII

TAKING GUESSWORK OUT OF GAS COOKERY

THE points in buying a gas range are for the most part the same as in purchasing an electric range. It must be of the best material, cast iron or sheet iron or a combination of the two, the ovens usually lined with steel, upon which is baked aluminum or a vitreous enamel. Enamels are more expensive but their sanitary value is great. Everything must be of the best quality, no seams or roughness can be allowed to catch food or odors, and the stove manufacturers must give you a guarantee of almost everlasting life.

Stoves to-day are made with and without shelves, some have the ovens above, some below. But where the oven is below it is a great boon to have the top at least 32″ high—38″ from the floor is better, so that the oven is sufficiently high to obviate back breaking, and the cooking surface high enough to eliminate the back bend for the ordinary cooking processes. Ranges to-day are built so that there is absolutely no guess work either in management or accomplishment.

New Devices

A recent improvement is a stove with an oven heat-regulating device, absolutely controlling the temperature. Because this device is used by domestic science cooking schools, cooking must be an exact science. No especial training is required to handle this device, and

it has no working parts to get out of order; the temperature is simply controlled and maintained by the turn of a wheel.

This enables you to bake without opening the oven door. A chart is supplied by which you can cook any kind of dish, the time, the temperature and the necessary decreasing or increasing of the temperature being given clearly.

One new type of stove has the smooth top. It looks not unlike a coal stove. It has no aching voids for things to spill into, nor can pots tip over into the yawning chasms. This saves a lot of needless irritation, which is important with the present high temperaments of cooks and housemaids. This stove stands 38″ from the ground.

The Top

An interesting feature is that the whole top becomes heated and is usable, whereas in the ordinary four-burner top only four utensils can be used at once. This top is connected with a flue which draws the heat, so that there is no waste of gas. If necessary, the lids can be raised and the flame from the burner will just tip the utensil, the proper position for flames. The oven in this range is so planned that it can be opened from the bottom with either hand. Another stove has a top that is semi-smooth and semi-spider, allowing you both systems.

Should a vessel spill over in the "smooth top," the top catches the overflow and it is simply washed off instead of the usual pulling out of the tray and the messed-up burner plate, which must be scraped and cleaned. This range is made tall and narrow, ready for the small as well as the large kitchen.

All gas stoves to-day have the automatic lighter, which

Courtesy of Vulcan Stove Co.

THE SMOOTH TOP 38″ GAS RANGE TAKES THE STOOP OUT OF STOOPID COOKERY

gives you freedom from the use of matches and makes gas nearly as convenient as electricity. Of course, gas is hotter in the summer than electricity, and to obviate this many of the stove makers produce marvelously contrived combination ranges of gas and electricity.

Some stoves have plate warmers above and some have a shelf open and available on which to warm dishes, which also makes a convenient rack for dishes while the rest of the meal is cooking.

Nearly all stoves are equipped with broiler chamber, baking oven and wire shelves. One, particularly convenient, has, instead of the two full-sized shelves in the large oven, one shelf divided into two pieces, allowing for more elasticity in placing different dishes in the oven.

In the stove which has the oven heat-regulating device, there are many of the fireless cooker features with some of its drawbacks eliminated. For example, it has no thick walls which eventually become impregnated with odors of past meals; the time in pot watching is eliminated; you can do other work and yet be sure that your cooking is being done well. So much of the cooking can be done in the oven that fewer burners are necessary. This type is made in sizes varying from 35″ wide and upward.

Regulating Heat

When you are ready to put the whole meal in the oven, your instruction card will tell you the correct temperature to set the thermostat. You can then leave the oven unwatched for a period of three to four hours. No preliminary cooking is necessary; in fact, the things can be put on in cold water if necessary; furthermore. the cost of cooking is no more, and sometimes less, than with the old-fashioned hit or miss method.

Canning with this oven is simplicity itself, as there is no need to lift the big containers to the cooking surface.

Many people prefer the fireless-cooking, oven gas stoves. These are excellent when made by the best manufacturers and certainly help the servantless house greatly.

The old-fashioned methods of finding out if your oven is hot are as follows: Poking your head into the oven, perilous; thrusting an unoffending hand therein; browning pieces of paper or a bit of flour; burning the gas and letting it go at that; gauging the size of the flame: but these are unreliable, for everyone feels the heat differently and the quality of paper varies and atmospheric conditions differ. How many times have you cooked the same thing the same way, and have had success one day and failure the next. What waste—and how discouraging!

With the particular stove in question, the novice soon becomes an expert. As much of the cooking can be done in the oven, not so large a surface stove need be bought; a small family can actually use a two-burner surface.

Burners

The burners on all the best stoves are regulated by the gas companies, from whom it is wise to buy, unless you are purchasing the installed, made-to-order stove.

One firm emphasizes its burner because it spreads well; it claims there is a saving of gas, which is quite true. This stove also stresses its glass oven door. Now the glass oven door is a fine thing, but when meats are being cooked, the glass becomes greased, and unless cleaned off at once may leave furrows.

The cabinet stove is the type used practically all over this country. It sits on high legs and has the oven (top

Courtesy of Clark Jewel Stove Company.

TAKING THE GUESS WORK OUT OF OVEN TEMPERATURES
BY THE USE OF AN AUTOMATIC HEAT REGULATOR

or bottom), warmers and shelves. The stove without shelves is not called the cabinet style. Usually the cabinet has the ovens to right or left or below the cooking top. Some of these stoves have a separate splasher on the side of the back wall or the side wall; this is not absolutely necessary if the stove is so finished that the splashing will wash off easily. Some stoves are completely enameled, including splasher; others are just blue iron or polished steel. Of course, there are the expensive enameled stoves which only have to be washed for the dirt and dust to slide off.

The vital thing in the gas stove is the burner and its regulation. Nothing will compensate for poor burners, poor insulation, poor heating. Some stoves are so made that the linings come out and can be easily washed and greased with kerosene thus keeping them in excellent condition. But keep your ovens more than spotless.

The gas supply pipe when installed with a stove should be not less than ¾″ bore. Some companies advise making an iron pipe connection with a union coupling.

The best results for the gas range would be had if connected by a stove pipe to a chimney but great care should be taken to avoid a down shaft. Much moisture in a stove, which will slowly destroy it, denotes this down draft presence. Yet sometimes the flue connection is a nuisance, as it is at other times a necessity. In some districts the flue is necessary by ordinance.

Top burners must be frequently cleaned and when they are removed the drip pan can be cleaned too and the space in which the drip pan rests. Wipe off dust from the air mixer, that is, where the air enters the burner to make the flame cook. Grease your oven linings occasionally and your stove will wear longer.

If your stove happens to have a porcelain enameled broiler pan, take it out when not broiling in that oven.

Range Facts

Don't use a big flame when food or water is boiling. Nearly all the good stoves have air and gas regulating devices and with each stove the method is explained to the purchaser. Remember that you want a blue flame, that the tip only should touch the utensil and that the yellow flame may mean too much gas and cause smoking or it may mean too little air. Keep your flame at the blue point, with no yellow or white tip.

Before lighting any burner, try all the gas valves to be sure that they are closed and that there is no gas in the range. If the burners pop out close partly the air mixers.

The simmering burner on the new stoves is a great convenience and economy, if the burner is perfectly regulated. In most cases the air mixer must be nearly closed.

Cakes bake unevenly perhaps if they are set too near the front of the oven. Be sure to put them at least in the center or better near the back.

To prevent fish from burning while broiling or baking, grease the gridiron. In broiling steak, if it is thick, place it 1″ from the flame. If not thick 2″ or 3″. Keep the broiler door open while broiling. Heat the oven for ten or fifteen minutes with the door shut before putting the meat or fish in to broil.

Remember the tip of the blue flame is sufficient to cook; any other flame condition spells waste.

When your burners do not light, they are probably grease clogged. Remove them and boil them in a solution of washing soda.

Turn down the flame when the substance begins to boil.

Unusual cooking capacity in a small space is really one of the great advantages of the new stoves. Know your space, your family needs and then buy your stove from one of the best makers or order it through your gas company.

Manufacturers have tried to beautify their stoves, but when you buy see to it that you buy comfort first.

A gas range should keep in first class condition for at least fifteen years—that is, if you buy the best and take raesonable care of it.

All kinds of stove combinations can be had: gas and coal, gas, coal and electricity, electricity and gas, oil and electricity, etc. So every taste, every necessity can be met in stoves to-day. There is but one rule—buy what you need and the best of its kind.

CHAPTER VIII

THE OIL RANGE

WHAT makes it possible to live in gasless, electricless, coal-less, transportationless places in gustatorial ease and digestive comfort? The oil range. Not the old-time messy oil stove, but the efficient, capacious oil range. In districts unopened to modern improvements cooking is made a pleasure rather than a drudgery, with this highly effective medium, so effective that nothing that can be done on any other type of stove need be omitted in the daily routine. It has the maximum comfort and the minimum cost and trouble. This range too need never be lighted until wanted and can be "put to bed," immediately upon finishing the meal. So now there need be no place where man can not have his puddings, his breads, or his flap-jacks with speed and finish.

The two most important types of oil stoves with which it is worth your while to become acquainted are the wick and the wickless (kindler type). It is quite evident from their descriptive titles that the former employs a wick as heat carrier to the vessel in which is the food; and the wickless has the kindler by which the heat is carried to the food in a different way.

The wick oil range is a development born directly of the lamp. It employs the round wick and with it in its best form a long chimney is used. This long draught chimney has proven in the case of the lamp to make for perfect combustion of the oil. Hence after

many years of trial and proof the wick stove is developed to a delightful point of comfort and utility. Speed, lack of odor and perfect work, three necessities of any stove, are here exemplified, to say nothing of longevity and ease of upkeep.

You have probably used the heat from a lamp chimney to light a cigarette or a match or even to heat a curling iron? Well, this is really the principle of the wick stove. This heat has been harnessed and petted into cooking usefulness by expert heat and stove engineers.

The parts of the wick stove with which you must be acquainted are few but important:

1. The burner
2. The wick
3. Flame spreader
4. Brass wick tube (a fine feature, in that it is of brass)
5. Clamp set screw
6. Hand wheel to adjust screw
7. Little mica door which opens in chimney instead of having to pull off the chimney as you do in lighting a lamp.

All you have to do is apply the match and touch off the wick at several places. Then lower the wick until the flame is even.

To extinguish the flame, turn the little wheel to the left. *Never blow it out.* This blowing out of the flame causes all sorts of irregularities and the real troubles.

The oil range is supplied in the best types by gravity conduit. That is to say that the oil flows from a reservoir into the burner, and as the oil is consumed the fresh oil flows down and takes its place, so there can never be overflow to cause fires or odors. These reservoirs are of glass and in one case the manufacturer has

a service of reservoirs which supplies the consumer with a rack of three filled reservoirs, which in turn replaces the emptied one. This obviates entirely the need of the cook to pour oil in the reservoir or in fact know she is using oil! Reservoirs of course are delivered and called for, if you are in reach of a dealer. Where this service is impossible to be had the pouring of the oil into the tank is simpler than simple. It is no more difficult than pouring milk into a glass. In truth the reservoir is mechanically adjusted and filled with oil—the human being but its guide and beneficiary.

The heat wanted in the wick stove depends on your culinary need and consequently on how high or how low you turn the wick. Very often it means when the flame burns low when it should burn high that the wick needs a cleaning. Don't blame the mechanism. It is difficult to say how often you need to buy a wick or how often it should be cleaned, as it depends very much on the quality of the oil that you have to use. Some kerosene is charry and some more free from impurities than other kinds of kerosene.

Here are some points to observe if you want good results.

1. If there is a gap in the flame, the wick needs cleaning. There should be a continuous round fence enclosing the burner around the flame spreader. Or it may mean the wick is up against the flame spreader.
2. Be sure that the wick is not up against the flame spreader after lighting, because it will prevent the air from passing through the center of the brass wick tube and cause over-heating of burner and a murky flame.
3. The flame when high should show white points above the blue body of the flame. These white points should be about 1¼" for perfect combustion. That means that there will be no odor and that you

will get all the heat you need and no waste of fuel.

4. The flame has lost its usefulness when the line of demarcation between the white and the blue is gone. The flame will begin to smoke, the burner will be over-heated, the cookery under-heated, and odors and smudge will be the result. Here again the human equation comes in. Use your eyes effectively.
5. Cleaning wicks is done by removing the chimney even as you do in cleaning a lamp wick. Nothing new in this.
6. Watch your reservoir; never allow it to run dry or your range to burn dry. Form a habit of watching it daily and you will never regret it.
7. Under usual circumstances one wick should last several months.
8. Clean wicks daily for best service.
9. Correct unevenness of the wick with a pair of scissors.
10. For re-wicking, arresting any other troubles, consult the "guide book," which gives directions simply.
11. But remember when you get any kind of range you must set it up solidly and level before filling with oil or cooking upon it. Put it in a part of the kitchen away from draughts and where you would put any other stove.
12. Every range has special directions for inverting reservoir and refilling, but in the best types it is always very easy and simple, needing no strength or skill.

And so in the best type of the wick range we have the possibility of cooking everything that any family or its guests need.

Wicks are easily bought all over the world. The stoves heat rapidly; the oil reservoir is easy to fill; your hands need never be oily, unless through crass

carelessness. There is a basin shaped stove base to collect char and dirt and the feed pipe is so placed as to make cleaning easy.

All the parts should be easily removable for cleaning and all should be simple and visible in every part. This grown up lamp should have all these modern twists.

In the best of the wick type you should have the best vitreous enamel, where it is enameled, baked in at least three times; solid brass wick tubes; best grade of steel tubing and heavily tinned plate pipes where necessary.

In the long chimney-wick type the flame never touches the vessel. In the short drum type the flame does touch. One wick type manufacturer makes a perfect long chimney type yet also makes a short drum type to give all consumers their heart's desire.

Wickless Ranges

The wickless, as its name implies, has no wick but carries the heat directly to the cooking vessel and therefore shortens the cooking time a little as the heat reaches the spot more quickly than it can in the long, non-flame touching type of range.

In this type of range a kindler is employed. This kindler is a round asbestos ring (costs about 10 cents to replace) which lies in the burner bowl and is slightly corrugated at the top and stiffened by a metal band. Its function is not that of a wick at all. It is rather the self-starter of the stove and its business is to light the oil and start the cooking. The stove is lighted by applying the match to the kindler which is saturated by oil (from its very position) and this ignition of the kindler furnishes sufficient heat to the surface of the oil to turn it into a gas. After the burner is started the heat automatically keeps the gas forming (vaporizing) as long as there is oil in the burner. So you can see that all the kindler does is start the gas ball rolling.

The wickless type of range is equipped with a 12″ seamless burner, which will last several years. The regulation of the heat is managed by lowering or elevating the oil in the burner bowl. The greater the area of oil exposed on which the heat from the kindler ring can act the greater the amount of gas formed and released, and inversely the smaller the area of oil surface exposed, etc.

This range, in its best forms, employs a lever with a dial, which when turned by the cook to the point in the dial she knows by experience she needs, automatically and mechanically adjusts the heat from simmering point to the most intense heat through a heat scale from "no heat" to 300° Fahrenheit.

With the dial there is taken out of oil cookery the guess-work which resides in most cookers.

Here is used the short chimney, with very concentrated heat focused where it is most needed.

In lighting, you turn the lever to the word "light" on the dial. After the kindler is saturated, generally a few seconds after switching the lever, the chimney must be raised and the match applied in a few spots to the kindler. In a few moments your blue flame is going full blast or any blast you desire depending on your lever setting.

Gravity supplies the oil here too, as in the wick type. The reservoir with its glass bull's-eye to detect oil quantity holds a gallon of kerosene sufficient to last sixteen to eighteen hours for one burner, or at the rate of about one cent per hour. Refilling these reservoirs is very simple, and when you go to buy an oil range this is one of the things you must insist upon. Unscrew the cap in this case and pour in your oil, that is all. There are a feed pipe and release which gather any sediment that may be in the oil.

Flame Regulation

Experience is the best teacher in the way of knowing where you must set the lever to get the hottest flame. Sometimes dependent on varying conditions, the flame may be highest when the lever is over the 12th division of the dial; sometimes it may be at 6 or 7 on your range. This sort of thing you learn by knowing your range. Some oil will, of course, be left in the burner after the light is turned off. Therefore you must expect it to burn a little while after you have turned your lever to "out."

The blue flame to be just right must touch the vessel with its uttermost tip.

On some of the most modern of this type is a match scratcher plate which makes it easy to light the match without using your shoe, a good white wall, or the seat of your pants.

Every stove in this class is made of the finest pressed steel, and where the enamel is used it is of vitreous variety with three bakings. There is an all white stove, too, to fit in with the bridal effect of the newer kitchens.

The good points of the wickless stove are many:

1. No wicks to clean.
2. Unleakable.
3. More powerful burner than anywhere else, being 12″.
4. Burner 100% odorless.
5. Delivers heat where it does the most good.
6. Acts a little quicker than any other types.
7. More economical in upkeep.

Either one of the stoves herein outlined is the best on the market as to type and manufacture. If you have to buy a stove try and get the most for your expenditure by a collection of the best traits in the stove.

No mechanical device is perfect without perfect handling. If you do not put in the wick correctly, or if you do not light your kindler sufficiently you will have trouble. If you put a tire on your car in the wrong way you would not blame the car, yet the tendency is always to blame the oil range and immediately call up your dealer and say that your stove is smelly or that the wick won't burn or that the kindler won't start, etc.

The best firms give every consumer a little text book to consult when in difficulty.

These stoves even in electric and gas regions are used in summer because they are cool cookers.

The advantage over coal is evident, as there is no fire to clean out, no kindling wood necessary, no ashes to carry and no coal to lug about, to say nothing about wondering about dampers, flues and the like.

In all ranges burning oil of the best makes, you can have all the heat you want and as little as you want as well.

On all well proportioned ranges you can put some of the excellently constructed ovens.

The ranges come with from one burner to five burners. Some are built in cabinet style, with shelves, etc. Some just plain style. As yet none of the cooking surfaces is quite high enough; a few inches added to their stature would make cookery easier on the human back. The cabinet size usually stands about 54½″ high, 64″ wide.

The spaces between the burners is ample for comfortable placing of utensils. Watch this when purchasing a stove, for you can be very uncomfortable with a jammed surface.

It is pretty much a matter of what you can get in the way of either of these two specific stoves. They are both so good. The wick type is convenient because the wick is sold all over the world. The wickless is con-

venient because it is easy to clean and is a bit more rapid in heating. The kindler is only 10 cents and can be had at all dealers and when you buy the stove you can get a supply.

You must demand:

No odor whatever
Speedy cooking
Steady flame
Cleanliness and easy to clean
Easily replaceable parts
No smut and dirt
Easy flame control
Oil visible in reservoir
Best materials on the market

Perfect combustion, making for the minimum amount of residue carbon.

With the oil range as well as with the gas, electric and coal range there can be bought water-heating boilers, ovens, etc.; and with one stove, special broilers and toasters.

There are two very good ovens on the market to be used with these stoves and with other kinds as well, each one with its special selling points. Each is large enough in some size for a 12 pound turkey, each small enough for the smallest uses (sizes range from 21½″×18½″×13″ to 13″×18½″×13″). They weigh from about 12 to 18 pounds. You place the oven over the surface burner.

One oven maker claims:

Asbestos lining for insulation
Shelves set for 5 different altitudes
Curved top to oven like bakers' oven to pass off gas and prevent air pockets
Shelf support growing out of lining
Strap hinges

One motion to handle to open oven door
Door closes only if it locks
Special asbestos lining porcelain enameled heat spreader, triangular in shape, to deflect heat and prevent burning

Another says of itself:

Special heat resisting lining
Mica windows below to watch flame
Unbreakable glass and unstreamable
Three point locking device on door
All glass door.

The oil range is not cheap. Yet it is a godsend at certain times. We are not advocating it for general use where pipes and wires and coal are at our convenient disposal, but we do recommend it forcibly and sincerely where you want a simple, efficient cooking medium beyond the reach of the popular sources of heat.

Unless you buy the very best, not merely the best, oil cooker you will be saddened, and with the best you will sign yourself Pollyanna without resevations.

Just about now, a new oil range is being advertised. It is a cross between the wick and the wickless, because it uses an asbestos and brass thread wick which is almost immortal, for it can be reversed when charred and when both sides are charred it is burnt off in the stove and ready to begin its double life again.

Like the wickless stove the flame touches the vessel with the short drum construction, and like the wick it uses a wick even though quite different.

The stove is of japanned tin, and is made in cabinet type and in the ordinary style. It is also in the "best" class.

CHAPTER IX

COOKING BY ABSENT TREATMENT

THE fireless cooker is primarily a fuel saver. Secondarily, it has developed into an absent treatment cooker. That is, the food can be cooking while the lady of the house is airing the baby or at church or at club entertainments or while the cook is cleaning the kitchen, laundry and pantry. Thirdly, it cooks thoroughly and longly without the added expense of fuel or effort.

It was first made with a box and with excelsior and padding but the manufacturers came to the rescue as they always do to supply a demand and the comfortable fireless cooker was born.

Its story is short and sweet and to the point. The essential for the cooker is that it will cook by retained heat. Therefore, it must be built so that there will be no leakage of heat. For this reason it must have perfect insulation. The utensils must have covers that are clamped on so tight that they retain the heat generated by the stove or electric current. The lining should be non-absorbent of odors or "spill." Therefore practice has proven that aluminum, which does not rust and is easily cleaned, is best for this lining. The linings too, must be smoother than smooth and be as seamless as it is possible for them to be made.

For long processes, of course, the heated plates must be able to retain heat and for this, soap stone and iron plates have been found to be the most practical.

The cookers can be had with from one to three or four compartments. Therefore, a whole dinner can be cooked. They claim that you can brown with them as well as in the roasting oven. Browning can be to some extent accomplished by an accomplished fireless expert with extra heating of extra plates and the like, but for real crisp browning it is as well to take out the food and rapidly brown in the oven.

The best results are gained with the fireless if used in conjunction with gas, oil and electric stoves. With the coal stove there is a loss of fuel saving of somewhere around 50% due to the fact that it takes so much time to get up the fire in a coal stove before the plates are heated sufficiently to do their work in the cooker.

Therefore, it is cheaper if you are going to use the fireless to any great extent to have a one burner gas plate on which to heat your plates for the fireless cooking process.

Fireless Stoves

In the chapters on gas and electric stoves, you will find there mentioned the fact that there are some stoves so built that they have fireless ovens. That simply means that they are so insulated and constructed that when the cooking has reached a certain point, the current of electricity or the gas can be turned off (in some cases turning itself off automatically) and the rest of the cooking can be done by the fireless process or on retained heat. This, of course, is the ideal way, because then there is no extra paraphernalia in the house and the stove is built so that the back is not bent in stooping to the low fireless cooker. For this reason, we would suggest that if you have a fireless, it is best to have it on a shelf built for it or keep it on a table.

Save your back or your kitchen aid where you can, as we have but one back for every process in life!

The electric fireless cooker is one which has its own connection with the electric light circuit. It is not a stove or part of a stove—it is merely a most convenient cooker for which you are not forced to heat extra stoves or plates. It's a two-in-one combination. According to directions you turn on and off the circuit.

Cooking

After you become accustomed to the fireless, you will find that cooking in it is quite definite and the time and the schedule can be heeded like clock-work. Do not let the food cool in the cooker, or you will have the cooker odor to battle with and you will always have olfactory souvenirs. The cooling and steaming in the box will do this only too well. Air your utensils and cooker after each usage or your food will have a uniform flavor which to say the least is most unpleasant.

Remember that it takes longer to cook like this and that you will only save time by being able to do something else without fear that your food is boiling over or burning or what not. This cookery takes a little practice, it is like everything else, a case where practise makes perfect and where the good utensil and a good understanding work together for good, while a poor utensil and a slovenly understanding work together for a little hell on earth, and this is putting it not one whit too strong.

It is no doubt true that tough cuts of meat are better cooked by the long process of retained heat; it is no doubt true that cereals are much more wholesome with the process of retained heat, yet it is doubtful whether the fireless cooker is ever bought for these reasons.

It is bought, however, to economize time, service and food. There is less waste of food by the fireless process. You can buy cheap cuts of food if you have a fireless cooker and enjoy them.

So, the fireless cooker is not an embroidery it is the "bib and tucker" of culinary labor.

CHAPTER X

QUESTIONS FROM THE LEAGUE OF RATIONS

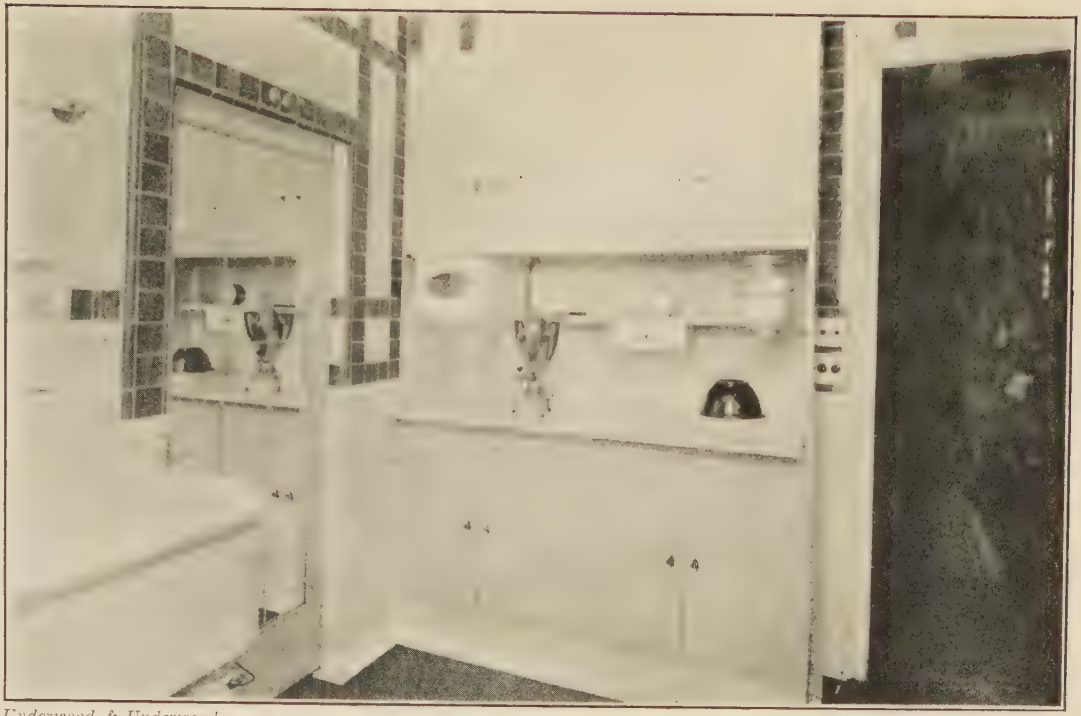
(A very possible conversation, but invented by the author to bring out some points that the reader will readily see.)

"JOY!" gasped Mrs. Gregory Eggleston, turning on the electric current for breakfast coffee.

"Isn't it a luxury after you've been out late," she said turning to her guest, Mrs. Bradford Reardon, "not to have to think of servants and be able to have breakfast like this at 10:30—with impunity! You know I think the kitchenette will rob domestics of house room!"

"It certainly *is* a luxury to have a little cooking kit like this whether one has another home or not. And to have it as you have—within easy driving distance from the theater, where you and your friends can spend the night and breakfast like kings from this shiny apparatus. Besides," she continued, "it's amazing how a little 6′×5′ room (see plan 1) does solve the omnipresent question of how to live in the country and yet not have to depend on hotels to keep one comfortable while attending to the affairs of business and pleasure in the city."

"You're right," agreed Mrs. Eggleston, taking some chilled oranges out of the refrigerator under the table, "Gregory and I wanted the country for our growing kindergarten and yet it seemed impossible until we



Underwood & Underwood

A CHARMING KITCHENETTE. THE STEEL UNIT CABINET LENDS DISTINCTION

thought of this scheme. Gregory has so many interests in the city and you know how many I have that it seemed almost exile to leave it. If we didn't have this place, I'd be on the road all the time, whereas now when I am home I can devote my entire time to the kiddies."

Dropping The Maids

"But," she went on, "you'd be surprised how Gregory hated the idea at first of a manless or maidless entourage. He said he couldn't bear to think of me messing with stoves, etc., and now you should see him! He loves it—he helps me too, and says it makes him think of our early days—and he loves me to wait on him and be alone with him."

"The kitchenette as the domestic canteen has come to stay," Mrs. Reardon said, and then looking about her with an amused flash in her eye, "but your kitchenette, dear, is like an ordinary kitchen. The kitchenettes I've conjured up when thinking of them at all, have been little curtained slits in the wall in the corner of two rooms without bath, clothes closets without clothes, bathrooms without baths, washstands capped with shelves full of canned goods and gas appliances all permitting of cookery with every requisite for human food except the desire to eat it."

"Yes," laughed Mrs. Eggleston, "I guess the only definition of a kitchenette is: a place to cook smaller than your previous one and smaller than any kitchen of any of your friends!"

"But," Mrs. Reardon continued with rapture, "your kitchenette is a dream. It always reminds me of jewels —the tiled floors, walls and ceiling like luminous settings and the apparatus like lovely gems. Really it breeds appetite and culinary prowess. Any one could

cook in this place! And when I'm not in such an esthetic mood I am reminded of an engine room in a small electric yacht."

"That is amusing," said Mrs. Eggleston, laughing, "but I hardly can see how it could be otherwise because Gregory and I thought of all the yachts we knew before arranging this kitchenette. He always says 'Well, dear, we certainly are ship-shape here—even if we don't own a yacht!'"

Whether the slit in the wall kitchenette or the tiled kitchenette is the only kitchen in the family, or whether the kitchenette is only for weekends of the foregoing variety, it must be small and ship-shape. These are the only definite kitchenette requirements.

The Necessary Equipment

It need consist only of a couple of three-foot shelves, so compact are the stoves and ranges made for light housekeeping. But roominess is no crime, so multitudinous are the tools to play with. Smallness, however, is unusually synonymous with convenience in kitchenettes.

Nearly every professional woman and many men in the large cities are banded into a huge League of Rations by the sympathetic tie of small kitchenettes. These compact cooking outfits make the lives simple, adaptable and healthful, they are the result of the hatred of the restaurant and café which turn steady diet into a farce, and they put an end to the régime: "Eat, drink and be merry, for to-morrow we diet." And so the slit in the wall or the covered cupboard is made the nucleus of home cooking and family feeling. No servants needed, none missed and a feeling that you are not living down by doing your own work but living up by managing the difficult combination of living well and

doing your job on the outside to the best possible advantage.

For the most part these kitchenettes are run by gas, but are for that reason cheaper in the cities like New York, where there is no cooking rate for electricity.

But the new appliances for the electric kitchenette are like toys, they are so fascinatingly contrived. You are crazy to have ice cream or whipped cream with which to employ the electric kitchen power unit which can perform all these miracles, and you are led into gustatorial and epicurean extravagances by cooking, boiling, baking and grilling at the same time on the new stove. A whole dinner can be cooked on the dining table with these new ranges even if you have no kitchenette!

The terror of dishwashing has evaporated! The electric dishwasher has been born and now our Ladies Eggleston and Reardon can, without lost of epithelial beauty, dash into the kitchenette for their matinal refreshment —sans sacrifice, sans anything but appetite and culinary ardor.

In the model Edison kitchenette, the utensils are hung up to avoid unnecessary spinal calisthenics. The sink is near the stove and is high enough to save the back from contortionate bends. All surfaces in the kitchenette should be an inch or so higher than that which the palm of the hand can reach without bending the back. The floors should be cement or hard wood with mat or with linoleum, either cork inlay, tile or brick; the ceiling of a light color paint or tile or brick; the walls the same and all joinings rounded to avoid the cracks at the base of the wall joining the floor, or where the wall and ceiling join.

The best kitchenettes are tiled or bricked with generous water vent so that the light hose played on them flushes and cleans them in no time.

One of the best arrangements is to have the kitchenette apparatus follow this succession: (See Plan 1) Drop table, closet, sink, work table, refrigerator beneath, shelves above, utensils hung underneath, stove, on either side of the sink drain boards of hardwood tilted toward sink or copper or composition slightly tilted; and a garbage chute on right side of work table near the sink.

However excellent or concentrated the arrangement, there can be no success, however, with any machinery unless you know how to use it advantageously; so as engineer in the electric kitchenette you ought to know a few things about the mysterious current over which you preside; how to use it economically, how to use it to its full capacity minus disaster and how to have the same mental attitude toward your kitchenette equipment as the workman has to his tools. In the Edison kitchenette is a little sign with the following legend:

Turn off the current when the range is not in use.

1. Start the oven on high, then turn it to medium or low.
2. Turn oven off completely and finish baking and roasting on retained heat.
3. When contents of pot are boiling fast, turn the plate to medium or low for long cooking.

Turn off current when nearly done.

Complete the cooking by retained heat in the plate.

In a little booklet is found this advice:

Fires caused by the use of electric stoves are mostly caused by carelessness.

I. Detach the plug as well as turn off current at the socket.

II. When you are not using any device continually shut off current.

III. Grasp the plug at the spring not by the cord.

IV. Blow-outs are caused by too many devices all

attached to the cluster plug. Reduce the number.

The utensils of these kitchenettes are without end; some of them are: Tables, ranges—aforementioned; oven and grill combinations; griddles; toasters; percolators of all kinds; large and small ranges; ice cream freezers; combination meat grinders; ice cream, whipped cream and dough mixing units; electric ice makers; automatic time ovens, with clock attached so that you can put something in to cook and at a designated time the current turns itself off; immersion heaters, coffee mills; samovars; egg boilers; buffer, etc. for sharpening and polishing silver and knives; and countless other things.

But the latest of all is the electric kitchen cabinet or "Movie" of small price and great compactness; gas or electrically ranged and arranged, containing in its simple confines, pots, pans, ice box, folding table, flour bins, stove, shelves for dishes and all the comforts of home. Just the thing for one night stands or bachelor's retreats!

And jot this down—that if you have a good refrigerator, electric or plain, you can have all the onions inside of it that you want without affecting other foods, and if you have an electric ozonator you can cook onions in the smallest kitchenette without damage!—so they say!

CHAPTER XI

KEEPING IT COOL

SHE rang for the butler:

"Wilson, please ask the chef what kind of a refrigerator the architect put in for us."

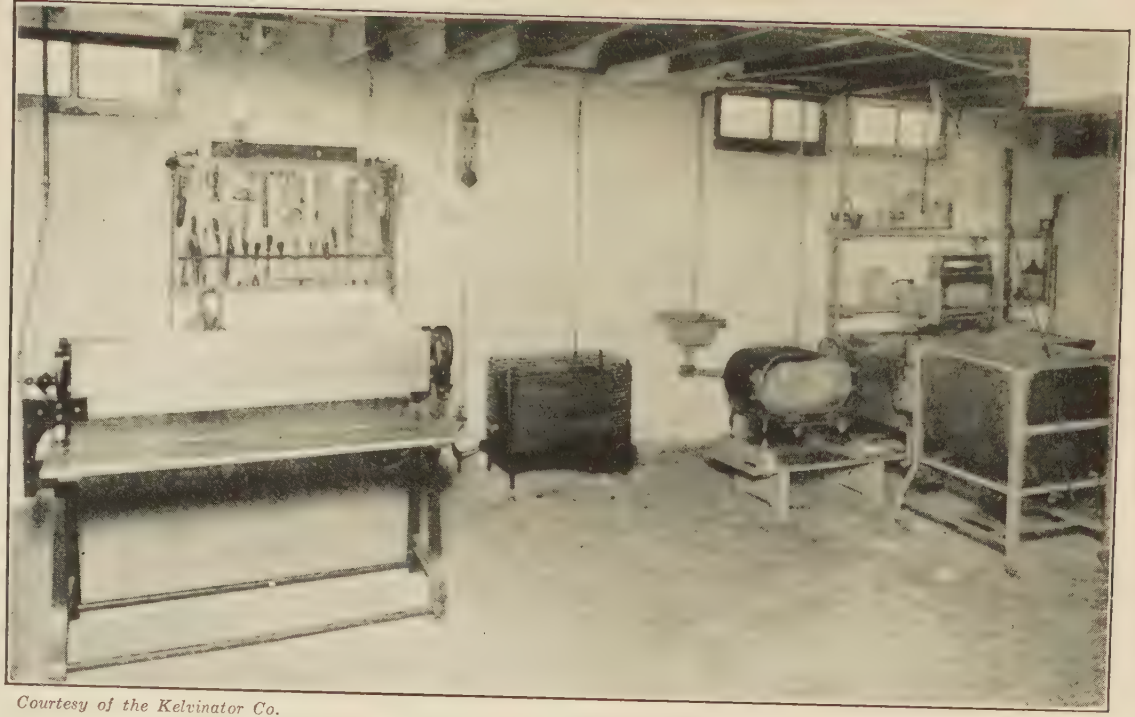
"Very well, madam," and he departed to the kitchen.

This same chatelaine did not send for the butler to inquire what kind of an automobile her garage held. Not for a moment! She knew, too, the difference between the Rolls-Royce, her car, and the Ford, or any other car! Yet, she didn't know her refrigerator! And to-day, although all the world's a-wheel, the very crux of the situation is the refrigerator! Peace—war—the economic structure of nations hinges on the preservation of food, not only in refrigerating cars, but in our kitchens; for, as our kitchens save food, just so much more easily will the world be fed and unrest cease.

Beyond much doubt the chic porcelain-lined refrigerator of to-day is the corner-stone of the halls of domesticity; for what in the unconscious song of every husband is a wife without well-kept food! And is there any romance that will survive flabby lettuce and pulpy celery?

How It is Made

The booklets about the refrigerator are entrancing! The pictures bring to mind marble halls, à la Alma Tadema, and you might wonder why he never used a



Courtesy of the Kelvinator Co.

WHEN THERE IS A CELLAR USED FOR THE LAUNDRY, THE ICE-MAKER COILS CAN BE SET DOWN THERE WITH EASE AND SIMPLICITY. HERE TOO IS AN ELECTRIC IRONER AND WASHER INSTALLED, WITH A VERY NEAT TOOL RACK!

modern refrigerator in one of his Roman paintings!

But you will remember that the linings of the refrigerator are not of marble no matter how much they resemble it, but instead must be made in one piece of smooth, hard, non-porous, non-warpable, non rustable material, the best type of which is the burnt-in vitreous porcelain in several layers on a metal backing. These linings must be made in one piece with no seams. No seams and seamless are quite different in their implication. "No seams" is what it seems to indicate, but seamless means a camouflage of joints. Joints and seams are food and odor entrappers and presage disease and death. Many of the advertised enameled interiors are made of nothing but paint heated, not burnt-in, which therefore flakes off or crazes (cracks form) and falls into the food, which of course is not a particularly epicurean sort of truffle!

The doors, too, must be seamless, jointless, screwless and smooth.

The shelves and other partitions must be of smooth, heavily tinned wire mesh. Smooth to prevent accumulation of food; and the wire mesh to insure rapid and unimpeded circulation of air.

The Nine Points

Whereas some refrigerator owners may keep butlers, the following points are more essential to the maidless home, because effort and energy and strength are saved to say naught of money and ice if conditions are such that the ice will not fade away rapidly and cleaning have to be done under difficulties of construction.

Therefore, to preserve the sanitation of the home and the consequent sanity of the world before buying a

refrigerator the following Nine Points should be laid before the Kitchen Diplomatic Table:

1. Does it: Maintain a low and uniform temperature?
2. Maintain a pure atmosphere?
3. Appear to keep absolutely sanitary?
4. Seem to be built to keep perfect circulation and an absence from odors?
5. Keep free from moisture?
6. Seem built to be economical in ice consumption?
7. Have a system to insure perfect drainage?
8. Contain a porcelain lining in provision chamber?
9. And does it seem to be built for durability as well as for beauty?

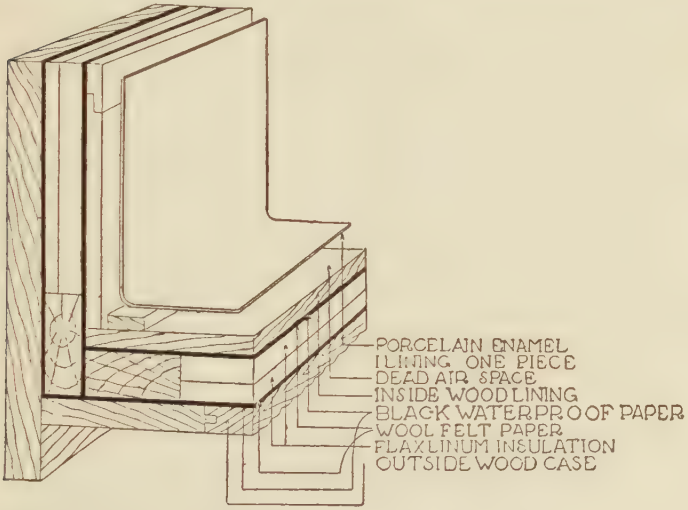
And now about enforcing the Nine Points.

The Insulation

How for instance is a minimum temperature to be kept? Chiefly, by insulation—this is a strictly mechanical term understood by motorists and engineers and must be understood by the housewife, who is a domestic or kitchen engineer if she is anything. The low temperature is kept by keeping out the outside heat and keeping in the inside cold! After much experiment, it has been found that the walls, floors and doors of every refrigerator must have at least one air space, from six to nine layers of insulating material consisting of pebbled cork, or certain patented materials, mineral wool, asbestos and various layers of porous substances which keep out the outer warm air and prevent the cold air from escaping. (See illustration.) Well insulated refrigerators backed up against boilers, stoves or vats maintain a temperature far below 58 or 60 degrees; some, the best, maintaining 50 degrees.

As to Ice Chambers

The ice compartment should be above, and to one side, so that the cold air from the melting ice can descend, as is the custom of cold air, and can rise again as it gets heated in its contact with the provisions and pass up over the ice, be cooled and pass down again with its collected odors through the drain. This is what is called



Courtesy of Bohm Syphon Co.

NOR COLD NOR HEAT CAN GET BEYOND THESE FORTIFICATIONS

air circulation, and when the ice box is properly constructed, and when the ice compartment is kept full, the air is in constant motion, traveling over and over again up and down and around the food and ice. This constant activity of the air is what insures an odorless condition, unmouldy and cold food.

In the best refrigerators the ice chamber extends a few inches below the door and is lined with the highest grade of smooth galvanized metal, lock jointed, and is without seams and sharp edges.

In some refrigerators the wall between the ice compartment and the provision chamber is slatted, in some there is a space at the top, in others, holes are bored, top and bottom, to permit the free egress of the circulating air. These methods are good in varying degrees. The main things to be kept in mind are:

1. Does the air circulate enough to prevent any moisture accumulating in the refrigerator? Can salt be kept dry and granular in it for one hundred hours?
2. Does the refrigerator keep below 60 degrees, or better between 45 and 50 degrees? Will a damp cloth dry quicker inside than outside of it, because of the rapid circulation and dryness of the air?
3. Do matches keep dry and can they be lighted by being struck on its walls? (This shows whether the ice box is dry!)
4. Does the milk taste of cheese or the butter of the soup?

If they have any "acquired traits," you may be sure the circulation of air in your refrigerator is bad or else there are seams or crazes in the tile, holding odors in their grip. Tiles and other beautiful interiors have in many instances been discarded by many makers because of their brittleness or pertinacious grip on odors —which, in the form of gases, poison foods and hence the family! Opal glass has been dropped because of its fragility in lighter weights. There are, however, some manufacturers who use tile with excellent result.

Another important feature is the drain pipe, more important almost than the exhaust on the motor. If this pipe is not constructed solely to carry off odors and

waste materials from the cleanest ice and not to import insects, gases and warm air from the sewage of the town, it will collect a very tidy packet of typhoid, diptheria or any home-seeking germs. This drain ought therefore to have a water-sealed trap in it, it should be smooth, of hard, well-finished metal and be so simply cleaned that the kitchen maid, or whoever is delegated to perform the laving of this important part of the household, should not look forward to the performance with horror, but with a sense of ease.

There isn't a doubt that a faulty drain in the refrigerator has caused more typhoid than anything else.

Think what it means then to be a good kitchen engineer—what service you can render your family! Few home-keepers realize the necessity of understanding the underlying principles of air circulation, sanitation and germination but what a lot of misery could be avoided if the chatelaine or even the wife-cook had a little technical knowledge. How this would dignify the science of the home. And yet how lightly is the function of home-keeper assumed and how many brainy women look down upon it!

How to Use a Refrigerator

But if you have everything to assure perfection in refrigeration and know not how to use it, it is as if you had none at all.

Note this amendment to the nine points:

1. Keep your ice chamber *full*, even after Dry Laws. It saves ice and preserves your food. The circulating air will only go "over the top" as far as the bulk of ice drives it.

2. *Never put any food in the ice compartment.* It must play an infinite solitaire.

3. Keep the doors shut, and open them as little as possible.

4. If the ice gives out, take out all the material and rinse out the refrigerator. Refill it with ice and keep the door shut at least six hours. And remember sufficiency of ice insures efficiency of refrigeration and efficiency of refrigeration means a sufficiency in expenditure—for a refrigerator.

Water coils can be put in some ice chambers which connect directly with the water supply. In this way the water can be kept continuously cool for drinking under all conditions of outside temperature.

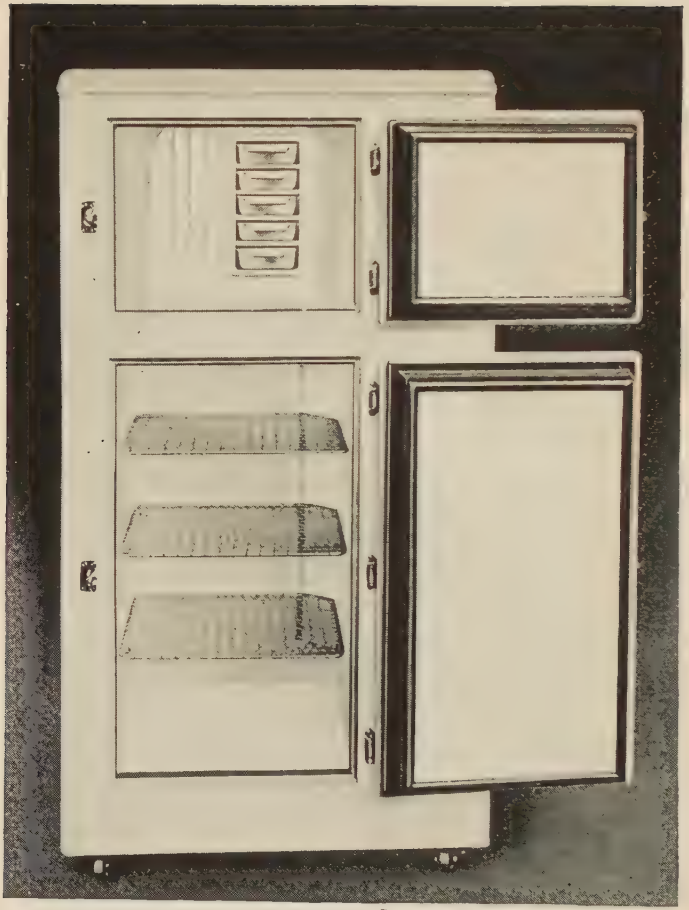
The outside of the ice box should be of hard wood or porcelain, the hardware of the best, including lever door handles.

Back doors for filling the ice box can be set so that the ice can be put in from the outside of the ice house, room, pantry or kitchen. This avoids useless handling and melting of the ice and obviates the iceman's journey through the house.

And, above all, choose a refrigerator that has no unnecessary "improvements" in the ice chamber which have to be taken out and scalded. The easier it can be rinsed from within the more often the attendants will clean it!

And remember this, too, that an ice box is a cooler where the ice and provisions go in the same chamber, while the *refrigerator*—well, you know it all now.

And, by the way, if you want a useful little device to keep your grape juice or yourself—cool—while motoring this summer, look up a little basket refrigerator which comes in many sizes and many prices.



Courtesy of Electrolux Servel Co.

GAS REFRIGERATOR: THE GAS FLAME THAT MAKES THE COLDNESS IS IN THE LITTLE PANEL BEHIND THE DOORS WHICH YOU SEE OPENING OUT. "SOME GIFT!"

CHAPTER XII

THE PASSING OF THE ICE MAN

"HOW would you like to be the ice man?" is the lyrical refrain to an ancient ditty that is getting more and more obsolete every day, for there is a mechanical conspiracy to oust the ice man from his age-long position as purveyor to the home. So do ice men, gladiators and dogs have their day and relinquish to machinery their evanescent glories.

Nowadays everybody knows that there are domestic refrigerating plants for home use that displace the ice man and in which pure ice for table use can be made. Many people, however, do not realize the reliability of such equipment, the simplicity of its operation, and the satisfaction to be derived from its use, nor yet that there is an actual saving in its use. These facts will, however, be borne out by thousands who have freed themselves from the bondage of the ice man.

Even though few will care just what contributes to making the coldness, it might be well to give a simple explanation of the principle of making ice, in order that the prospective purchaser will know what she is getting.

When you wash your hands they feel cool if you do not dry them. You say they are cool because the water evaporates, but the fact is that the evaporation takes place because the water is drawing on the heat from the air and your hands feel cool in the process. And so in simplest terms engineers have found refrigerants or liquids which vaporize or evaporate at low temperatures,

and as they turn from liquids to gasses they use up the heat and leave the air cold. Some of these refrigerants are sulphur dioxide, chloride of ethyl, ammonia, etc.

There are two ways of having refrigeration in the home:

1. The mechanical refrigerator (which is permanently cool with the machinery a part of itself)—one unit.

2. The domestic refrigerating plant (for making ice and steadily producing even, low temperatures) which you can have installed in your own refrigerator—two units.

The general system of home making-ice refrigerators consists of the brine tank with copper coils within, a motor-driven compressor and a condenser of copper piping. The compressed liquid passes through an expansion valve into the brine tank where the pressure is reduced and it changes into a gas, flows out through and is condensed by the condenser, changed back into a liquid, is pumped back again by the motor and starts cycling again—indefinitely. In the best ice-making plants there is a heat control which turns on the motor when the temperature in the refrigerator gets too high and turns it off when it is sufficiently low.

In one refrigerator there is a device by which the food compartments are kept at any temperature you desire, usually around 40°, while the temperature of the ice-making compartment is never allowed to rise above 20°. By this arrangement it is possible, and very often the case, that ice will be made in the ice compartment without running the electric motors for hours, while food is kept in the food compartments at slightly above freezing point. Fancy the health insurance that the best ice-less processes guarantee in the home—infant's food, for example, can be absolutely fool-proof.

Although the above technical libretto is of some use,

the things that most people want to know and are asking are these:

1. Is ice making at home practical?
2. Is it messy?
3. Can I use my old refrigerator?
4. Are they to be had in a special refrigerator?
5. Will I save money?
6. Will it save time and annoyance?
7. What's the use anyway?

A good refrigerator is a jewel, and it is the first requisite to be considered. It must be insulated well enough to keep out hot air and hold in cold. It must be seamless and smooth in its linings. The air circulation must be continuous. The temperature inside must never be higher than an average of 45° and rarely that. In such a refrigerator one should be able to keep matches dry and butter must never absorb any of the charm of the onion.

If you have such a refrigerator, keep it by all means, and install the ice-making machine. The installation is simple, and the initial expense is readily made up in the future saving of ice consumption. But do not install an excellent ice machine in a poor refrigerator, as the electric bills will climb the Alps. Yet even in a poor refrigerator the refrigeration bills are lower than if you had iced refrigeration.

If you have no refrigerator, it is possible to buy a refrigerator which has in it the ice-making machines. But before you buy the outfit you must be very careful to know whether this refrigerator comes up to the most stringent tests of the ordinary first-class refrigerator, for this reason: The average refrigerator in which ice is used has to be efficient because it must keep itself dry with actual ice evaporation going on, it must keep a cold chest with an actual diminishing ice supply, it must

keep ice melting yet staying in spite of weather and surrounding atmosphere. To make the circulation of air effect these processes a refrigerator requires fine construction.

The refrigerating manufacturers have put the most superb effort into making a first-class refrigerator, and if you are not convinced that the combination outfit has as good a refrigerator as you can get with the installed outfit, it is wisest to buy the refrigerator and install the ice-making machine. There are excellent refrigerators on the market; apply rigid tests and accept nothing short of the best.

The machinery can, in some instances, be put on top of the refrigerator or in the cellar or in the next room or right next to the refrigerator. In some cases the machine, consisting of pump and condenser and motor, takes up no more room than $1\frac{1}{2}' \times 1\frac{1}{4}' \times 3\frac{1}{2}'$. This can be put in place as simply as installing a new gas stove.

In the best of the iceless machines the refrigerator maintains a lower temperature than the iced ones in both winter and summer. At a cost of ten cents per kilowatt hour, and with ice at fifty cents per hundred pounds, it is cheaper per day to use the iceless refrigerator.

There is, too, less dampness in the iceless refrigerator than even in the best iced ones, due, of course, to the absence of the ice itself. This lower percentage of humidity should not be taken as a reflection on the low percentage of humidity that can be maintained by the iced refrigerator of the best make, which is a percentage low enough to dry towels and keep matches dry.

The iceless refrigerator does these things:

1. Reduces the cost of refrigeration.
2. Maintains a constant low temperature regardless of weather and automatically starts up "cold mak-

ing'' when you raise the temperature by opening the doors.

3. Operates automatically when once installed and is reliable, clean and noiseless.

4. Permits you to make neat little cubes of ice for your tumblers, which give your table distinction.

5. Gives you ice of which you know the clean source.

6. Operates by electricity.

7. Needs no refrigerant for years.

8. Is oiled very seldom.

9. Is easily kept clean.

10. Obviates the uncertain ice man and his dirty boots trailed across the kitchen floor.

11. There is no ice-box drain to clean, no water dripping to worry about and therefore no extra effort.

12. Consumes from 1½ to 2 kilowatt hours per day —if it is run from 6 to 8 hours per day.

The purchaser of an ice-making refrigerator or a domestic refrigerating plant should be warned of the following:

1. A poor refrigerator will mean more electricity to keep up a sufficiently low temperature.

2. Don't let a manufacturer tell you that a freezing refrigerant, such as sulphur dioxide, will escape and corrode the pipes. It has been tested out and in the best machines has neither escaped nor worn out its pipings.

3. Remember that opening and closing doors raises the temperature even in the magic iceless paradise, and therefore uses more electric power to keep the temperature down.

4. The best machines maintain the ideal and theoretical low temperature.

5. Expect service from the manufacturer.

6. It is best to have the gas air-cooled and not water-

cooled because the introduction of water makes for the confraternity of gas and water—a troublesome mess.

7. Demand the temperature-controlling automatic device which starts the refrigerating when the temperature gets up around 39°, and cuts it off when the temperature is low enough to do its work. This saves electricity and wear and tear on the machine.

Some iceless refrigerators make little cubes of ice by putting trays of your favorite drinking water into the brine tank compartments. In these the temperature ranges from 20° to 27°. Desserts, too, can be frozen firmly and surely when placed in these trays.

The brine tank fits easily into the ice compartment of the well-made refrigerator. The brine tank, compressor, condensor and pump come in three sizes, corresponding to an efficiency of making two hundred, three hundred, four hundred pounds of ice per day. Actually these three typical sizes of refrigerators can only store ice to the amounts of one hundred and fifty, two hundred and three hundred pounds, a difference being allowed for melting.

The condensor, compressor and motor of some types of ice machines do not take up any more space than that of 30″×16″×18″ high. This can be installed anywhere.

When ordering an ice-maker for your home refrigerator, it is well to measure its interior, regardless of its compartments. Get the width, depth and height, and multiply them together.

Compartments are now made to hold vegetables and keep them from drying out.

At five cents per kilowat the cost per day of running an entire kitchen by electricty is but fifty cents. Compare this to the cost of motoring per day.

CHAPTER XIII

A BURNING QUESTION

"LET me see your back-yard and I can tell you what sort of a housekeeper you are," said a sleuth to a friend. But we would add "and your method of garbage disposal." So we beg your attention for the tale of the incinerator, the modern and comforting Inferno, built to bring heaven (paradoxical as it may sound) into your home.

The incinerator, to be sure, is one of the last comers to domestic economy. To most homekeepers it has not occurred as either a necessity or a convenience; and for that reason this chapter aims to introduce the householder to the garbage incinerators.

Once upon a time the incinerator was made to connect with the kitchen flue and fitted into the stove pipe. The hot air was thought to be sufficient to evaporate the moisture of the garbage after the housewife had evaporated and dried it out as much as possible. This had to be done because moisture in waste is the deterring factor in its combustion. Then after this stove-like incinerator had done its work, the dried garbage itself would act as fuel.

But . . . there was one terrible flaw in this method and that was the fact that the odors and gases that were given off were not only unpleasant, but often dangerous and so for this reason this method has pretty well passed out of existence.

To do away with the odor and the gases released from

the combustion of household waste, the developing incinerator has been created and flourishes deservedly among us.

The enthusiast cannot say about the incinerator, as he can say about substitutes for his favorite drinks and foods: "If you don't have one, you will suffer torture and go down to your death in agonies of discontent." No, he cannot. But he can say this, "Although you can and do prosper without the incinerator, and although consciously you do need one in most cases, yet when you once own and use one, you find that it brings up the sanitary condition of your dwelling at least 50%."

In brief, it means doing without the garbage can which breeds odors, gases and vermin. It means doing without the garbage carts which are æsthetically, alone, a torture to say nothing of the menace they hold in common with their aide the garbage can.

Fly Costs

The fly costs the United States of America. it is estimated, about 350 million dollars a year because of its contaminating influence on the health and the weal of the population. It is alone responsible for nearly 90% of the intestinal and typhoid fever cases. The answer to this must be: Every one must fight the fly; and the moral of that is: the incinerator is one way of getting rid of garbage and at the same time starving out the fly.

There is no room in the house in which cleanliness is so important as in the kitchen; therefore, the garbage can, in most instances, militates against its absolute cleanliness. To be sure, there is one good can on the market with an automatic lid which is raised with the foot so that stooping is unnecessary. One touch by the foot on the pedal opens the can, and as soon as the foot

is taken off the pedal, the lid closes. It is seamless and finished in white enamel. But even this can is hardly a substitute for the incinerator. The average kitchen *isn't* the best lighted and sunniest room in the house, and what is often left in the garbage can (if not carefully lined with new paper every time it is emptied) is a real menace to health.

If you live in the country, the garbage can is usually in the yard and tours to it are demanded daily. If it is cold, it is a hardship, and if it is warm it is a hardship, too! The garbage freezes in the winter; it decays rapidly in the summer, and there is always the worry about its collection. If it is kept in the shed, it means other sources of storage and worry, so whether you are your own help or whether you have help, garbage disposal is a really truly problem.

Now to the device to obviate the immoral fly, extra steps, unclean kitchens, and worry, the thief of content.

The Incinerator

The incinerator, besides being the burner of garbage, is a garbage container. It burns garbage without smoke, noxious gases and floating inorganic matter. If the stove could do this, the incinerator would not be necessary, as suggested above. But it can't, especially if it be a gas or electric stove. Every incinerator, if it be any good at all, is so designed as not only to burn the waste but reburn the gases, etc., before the products of combustion reach the outer air.

Every manufacturer will tell you that his apparatus burns without smoke or odor. This you will do well to prove by observing one in operation, staying in the building in which it is being used and also whiffing the air a few doors away.

The writer knows of a bank which was severely tried

by a daily recurring odor at lunch time. The authorities found out later that the incinerator of a neighboring bank was playing its owner false.

There is no use in describing the re-combustion or re-burning devices of the good incinerator, but it is necessary for the buyer to know whether the re-burning is accomplished so as to reduce the waste to clean ash without smoke, noxious odors, and the rest.

The two main classes of incinerators are, (1) those that are installed in the cellar and there burn the garbage, which is dropped in a chute through a hopper installed by the sink or elsewhere in the kitchen (somewhat the way mail is dropped into the mail box through its chute) and (2) the incinerators which look like oblongly high stoves placed in a recess in the wall or against the wall in the kitchen where the waste is stored and burned. The cellar incinerator is connected with the kitchen, etc., often through the flue and the waste is dropped into a little hopper.

Of course, the installed type should, if possible, be put in with the connivance of the architect before the house is built as it is simpler than tearing up afterward. This type, of course, takes up less actual kitchen space.

Some homes use a large incinerator in kitchens (stove type and small ones in pantry or laundry).

Objects

The large installed incinerator should be able to burn up bits of paper, sweepings, old boxes, soiled rags, garbage, smelly waste and reduce them to sterile, odorless, clean ash. And if these things are not done without clogging up your flues with oily combustion residues, etc., you might as well burn your stuff in the kitchen stoves. The ash lift can be used for various things.

The ordinary portable type is primarily for garbage but some get away with whatever is put in them.

Construction Points

In the construction of the portable incinerator, the one that is placed in the room and not below stairs, you must be sure it is so built that the heat from burning is not communicated to the room to heat it up. This means then that the maker must think of supplying the apparatus with sufficient insulation to retain the enormous heat generated inside which is somewhere around 1600 degrees Fahrenheit. Just as your ice box is insulated against the cold air getting out, and the warm air getting in, so must your incinerator be insulated.

Besides, the lining of the incinerator must be durable and made to withstand not only the heat but the tremendous attack on it's walls of chemical substances released in combustion. Sometimes fire brick is used but usually clay or metal is used in the portable types.

Furthermore, the incinerator becomes a fire peril if the insulation and the lining is not 100% perfect.

Again the devices of air intakes and outlets, etc., etc., are questions for the engineer. All that we are concerned with, is whether the apparatus does its work.

Economy

The cost of operation is practically nil. The fuel used is gas or coal. Gas is the best method, the writer thinks. It takes only about twenty to thirty cubic feet of gas per burning, as the gas is needed only to start the operation and the evaporated garbage burns itself thereafter. Or should! There is a type of portable incin-

erator which needs no fuel, just burns by ignition of dry waste which burns the wet as it dries out.

Capacity

The incinerators are made in various sizes, burn from one bushel of waste and upwards, depending on the whys and wherefores of its uses—whether it is the installed type, or the stove type, or for what home or institution it is designed.

The stove types are purchasable in sizes ranging from 15 inches (wide) 15 inches deep and 30 inches high, to respectively 31×34×64 inches, and they range in price from about $70. and upward. (It isn't safe, of course, to give prices to-day on anything as they change continually.)

Casing

They are usually built of very heavy serviceable castings, brass and sheet steel, well lined and insulated. Everything is well hinged and the grates, which are removable, are made so as to be easily taken out when it is necessary to remove the ashes or substances not burnable except in smelters.

Summary

So almost in conclusion the incinerator is sanitary, destroys refuse, destroys it by burning not only the garbage but the products of the garbage combustion at a minimum expense, and it should sterilize itself and the flue in the process.

And it does away forever with the back bending disposal of garbage into low cans for the openings into which the garbage is put are high and comforting.

However, with all this we must not forget that gar-

bage, if it can be expeditiously taken off the premises at once and easily, is an immense help as fertilizer and food for pigs.

But it must have fine and careful care. The pits into which it is put must also have careful structure and care.

To the surburbanite the incinerator will be a boon—no more fussing about garbage disposal and about who is going to collect it.

And to apartment dwellers (and they are being put in apartments rapidly) no more elevator and dumb-waiter garbage and all the rest of the garbage nuisance.

And to the new home builder, a sense of the disposal not only of garbage but of a vexing sanitary problem.

Furthermore, because you have an incinerator, it doesn't mean that you should burn up good left overs. Never burn up to-day what you can use on the morrow, and with this injunction we think you will enjoy looking into the subject of the disposal of waste.

CHAPTER XIV

AIR AND ITS ENTRANCE AND EXIT

"AM I an *airess?* " not *heiress,* ought to be the question to ask yourself if you are really a responsible home manager. It seems strange that with all the air to be had for the asking you let it pass you by, content with whatever draughts and gusts filter through the cracks and crevices of your house.

Now it so happens that although air is to be had for the asking, you have to woo it if you want it. But it pays. Keep the air about you in good condition and you and all those of your household will soon find yourselves approaching the 100% efficiency ideal.

Business has found this out already. Do you know of any factory, good school, bank or department store, where there is not installed some sort of ventilation apparatus including weather strips as well? Of course not. Why? Because fresh air keeps costs down and keeps health up. On this relation of health and output, efficiency depends.

Does it not flash into your mind now that if housewives thought more of home ventilation and especially kitchen ventilation, you might have improved service, better tempered cooks, and more satisfactory life in general?

Of late there are cults of out-door fiends. All kinds of cold-attracting, pneumonia-coddling out-door fanatics, who try to tell you it is good to sleep in draughts, to have cold feet, and the like. Their advice is wrong.

The thing to do is not to subject yourself to the rigours of cold, but to approximate, in your warm, comfortable rooms, the sweet clean purity of out of doors. And this is easy to do by proper ventilation.

Ventilation can render air even better than the outdoor variety by purifying it of dust and by supplying it with the right amount of moisture and motion.

For the ordinary home the great air conditioners and ozonators, which are installed in institutions and factories, are unnecessary, so we will not consider them. The best, simplest and least expensive ventilating system for the home is the system regulated by fans and blowers, and to this method we will introduce ourselves.

Now, it is conceded by ventilating and heating engineers that the air, to be healthful, must be in ceaseless motion, and it must be renewed constantly and evenly. In other words, it doesn't make much difference if the air is burdened with carbon dioxide gas which we exhale from our lungs, as it does if the air is stationary. Hence the use of air agitators such as fans, etc. The theory is that, as the pores of our skin exude moisture, the body is comforted and cooled by its evaporation which is effected more readily by constantly moving air. Moving air, however, does not mean a draught.

In the ideally warmed house, the doors and windows are nicely placed so that the warm air gracefully exits from the top of the room and the cold air comes in from the lower parts of the room (such as lower windows or well-placed air takers.) Thus, the air is moving nicely without the least draught.

So it will in the use of the fan and blower types of apparatus on the market. But before we go on to describe them, it will be well for us to review some of the reasons why humans need special air treatments.

It is said by scientists that:

A Woman	exhales 600	cubic feet of carbon dioxide per hour.
A Young Man	exhales 614	
A Young Woman	" 453	
A Boy	" 363	
A Girl	" 343	

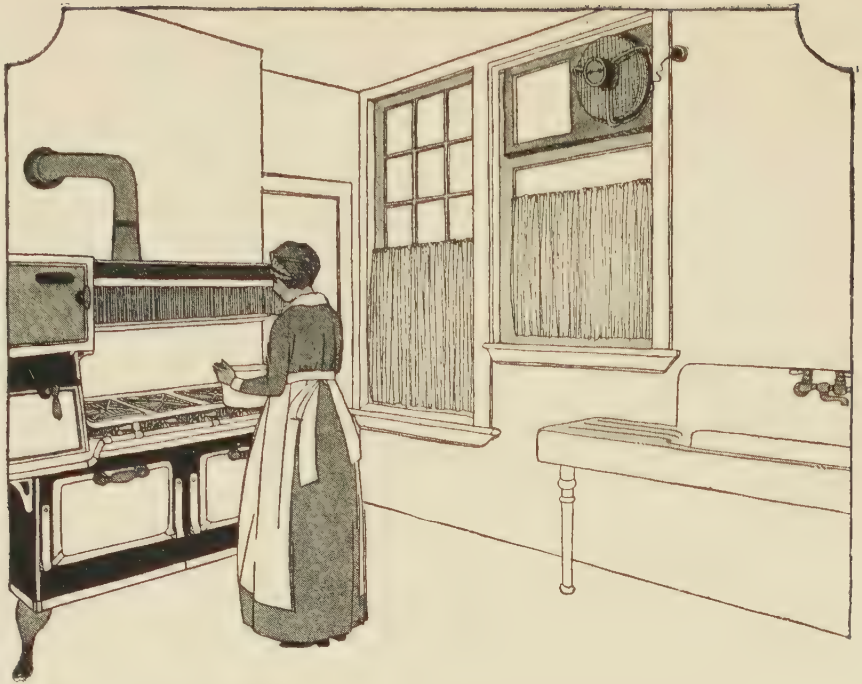
Whereas women don't breathe so much of what is noxious yet they have to look after their men folk! But joking aside, doesn't this impress you with the foolishness of inhaling so much vitiated air when the supply can be renewed so easily with fresh air? Also when you realize that humans give off 1000 grams of water vapor under normal conditions per hour, and emit 350 British Thermal Units per hour. (A. B. T. U. is the amount of heat which will raise 1 pound of water 1° Fahrenheit or from 32° thru 33° of heat—at normal, not heavy work.)

Another authority says that air should be renewed per hour:

10	times for	public toilet rooms.
6	" "	clothes lockers.
4	" "	small meeting rooms.
5	" "	public offices.
4	" "	ball rooms.
15	" "	kitchens.
20	" "	laundries.
3	" "	libraries.

The average air change in the average room is one to two times per hour. In the well-built house it is two to three—due to fire-places, windows, doors, etc.

Of course there are other opinions, but this data gives you an idea of the necessity of changing old for new air.



Courtesy of Ilg Electric Ventilating Co.

SHE IS COOL EVEN IN SUMMER WITH MOVING AIR

Good Ventilation

The requisites then for good ventilation are:

1. Equable temperature from about 60 to 65 degrees Fahrenheit, and the moderate relative humidity or moisture of 45 to 65 per cent. In order to keep the room moist in winter it is well to keep a pan of water on the radiator. Regular humidifyers can be bought for this purpose.

2. Clear air, free from impurities such as dust, insects, oily vapors, soot, etc.

3. Odorless air (you have been sickened by the use even of the most costly of perfumes!) free from gases and vapors.

4. Air motion; but the motion must be accomplished without those objectionable blasts of wind that so frequently startle you in some houses which are supposed to have the most up to date equipment. The weather strip is insurance against the gale.

Air isn't a mysterious chemical combination. It is a mechanical mixture of 21 parts nitrogen, 79 parts of oxygen, from 0 to 4% of moisture, and usually 4 parts of carbon dioxide gas per 10,000 parts of air, so it need not distress you to effect a good clean supply of air and equip your house with some of the steadily improving devices now on the market.

Some Devices

Any device to be useful to the home must, of course, be convenient, economical, safe to operate, and durable.

Well, let's begin with the kitchen; for this ventilation is more necessary than any place else in the house.

Not only is it difficult to keep the kitchen in equable temperature, but to have it cool often means a draft, and

a draft means a cold for the cook, and a cold for the cook means danger to the whole household. Then there are odors from the kitchen. These are continually getting loose, unless the door of the kitchen is kept closed (which is trying) and infecting the house prematurely with the taste of dinner. All of which is uncomfortable and gives the home a commonplace, tenementy atmosphere. Your home may be judged by its laundry and cooking odors! The fewer, the better. Did you ever think of that?

The cellar is another important room to keep well aired and should be provided with windows and doors to formulate a current of air. Pantry and laundry, too, should be built with ventilation in view in order that, as in the kitchen, these rooms can be kept sweet and savory.

Without extra ventilation apparatus, you can take advantage of the movement of air; as it cools, it falls and as this falls it is heated and rises again—keeping up a rotary circulation:

1. Lower windows from top and bottom so that the warm air will go out at the top and the cold air come in at bottom, starting the circulation of air.
2. If not too draughty, have a door open opposite the windows, or use a draught board or screen which can be easily placed on window sill to curb current.
3. Cool moist air can be had often by hanging up a damp sheet and re-wetting it as it dries.
4. Fireplaces with small or large fires in them cause air current.
5. In some rooms which have a grated air intake cut into the walls near radiator—air circulation is effected easily.
6. Give the risen hot air a chance to get out of the top

of room, and give the cold air a chance to come in at the bottom of room—and keep it agitated—this is about the best advice. If you can't do this, call in a ventilating and heating engineer—he will.

With the new type of ventilators, cookery odors, draughts, smoke, steamy vapors, smudges collecting over walls, curtains, etc., are obviated because they are all dissipated and sent flying to the big outdoors. It's blowers blow out the bad air. The apparatus, which is simplicity itself to operate, is attached to the ordinary lamp socket and placed in effective places. The improved motors are encased and almost frictionless in action, which means the minimum wear and tear and no cost for repairs. Some of the motors are self cooled which also does away with wear and hot boxes.

There are various kinds of fans which may be used. Those which change their direction in process of revolution are good. Some think they are better than the one-direction fan, and maybe, where the fan is used alone without other attachments such as purifiers and blowers, this style may be more efficient. It at least does the work more swiftly. But whatever kind you use, they should be so placed as not to make draughts. The steady movement of air is the only thing necessary, not hurricanes.

In the study it is necessary to have light and air and no draughts to blow papers away. The ventilator (which may be put on the window sill over the radiator thus obviating the uncertain winds coming crassly through the open window) will prove a boon to the writer or housewife.

Oh, Homekeepers, it is often that these office devices which are always employed where work is done, if installed at home, would keep your men folk and even your women office workers happy. You would be sur-

prised how many people would come home to do after-hour work if the home were as office-shape as business places. And the ventilator is a very good point at which to start.

It is nice to think that along with ice cream, the steam boat, and other American inventions, applied ventilation seems to be an almost pure American product! So, you patriots, here is a way to build real air castles that will build finer and finer things as you profit by the stimulus which fresh air, more than any one commodity in the universe, can give.

Weather Strips as Aid in Ventilation

No consideration of ventilation of houses could be complete without a few words on the value of weather strips. It is strange too that this precaution in the home is so little known and that the house-wife has so little knowledge of their infinite good.

Disregarding them as a factor in the cleanliness and noiselessness of the home, disregarding in this chapter the intriguing facts of their manufacture and application, they are adjunct at their best in the home because:

They reduce the possibilities of draughts and therefore reduce the possibilities of colds and rheumatism and the like. See Chapter XXXIII.

They keep the temperature of all the rooms as even as it is possible here below to keep anything even and therefore give the ventilating régime a square chance to function well.

In keeping welcome air in and unwelcome air out, in so far as is necessary, the reduction of fuel bills is enormous . . . from 15 to 50%! This to-day is a favorable asset when fuel is expensive.

With all the systems of ventilating in the world, if you have tornadoes flying about your floors from the

air you do not wish admitted, you cannot have a properly or healthfully ventilated home.

In short, the weather strip makes it possible for you to have your say as to the air that comes in and out and makes it possible for your heating and ventilating systems to work as they should. The hit or miss element in the home is again routed by the weatherstrip and anything that does this is worth considering.

CHAPTER XV

THE PLUMBING IN YOUR KITCHEN

ONCE upon a time there was a business man who, upon buying his first house, bought simultaneously a plumber's kit. He was sure he could save a lot of money by attending to simple matters himself. One day a simple faucet sprung a simple leak. He confidently used a complicated tool and the result was a vast sea of trouble. Plumbers! Expense! It is not necessary to draw the moral.

The plumbing in the house is akin to the alimentary canal in the human body, and is as complicated a system as the alimentary canal. The system of plumbing in the house is a series of pipes which carries water to the house, and eliminates it as it carries with it various forms of waste, connecting the house with the main sources of water, gas and with the sewage system. The best plumbing is that which effects these things with the least deterioration and with the least mixture of sewer gas and foreign matter.

Every community has its own plumbing laws and regulations. This is true unless you build in very rural sections where there is no sewage system. However, this article will deal only with conditions in which a sewage system prevails.

Plumbing Laws

As will be seen by the following excerpts from the plumbing laws of New York City, the ordinary house-

wife need not worry about transgressing the law, as everything, from the material used to the size of it and the laying of it, is controlled. And the plumber is supposed to know these rules before he is licensed. But it is in no way as glorious as poetic license!

All the materials must be of the best quality, free from defects, and all work must be executed in a thorough, workmanlike manner.

All cast-iron pipes and fittings must be uncoated, sound, cylindrical and smooth, free from cracks, sand holes and other defects, and of uniform thickness, and of the grade known in commerce as "extra heavy."

The size, weight and maker's name must be cast on each length of pipe.

All joints must be made with picked okum and molten lead and be made gas-tight. Twelve ounces of fine, soft pig lead must be used at each joint for each inch in the diameter of the pipe.

All wrought iron and steel pipes must be equal in quality to "standard" and must be properly tested by the manufacturer. All pipe must be lap-welded. No plain black or uncoated pipe will be permitted.

Each building must be separately and independently connected with a public or private sewer, or cesspool, except where a building is located in the rear of the same lot with another building, when its plumbing and drainage system may be connected to the house-drain of the front building behind the house trap and fresh air inlet which shall be used for both buildings if sewer connected; or may be connected to an existing cesspool of front house and be provided with a separate house trap and fresh air inlet.

Further Provision

Where there is no sewer in the street or avenue, and it is possible to construct a private sewer to connect in an adjacent street or avenue, a private sewer must be constructed. It must be laid outside the curb, under the roadway of the street.

All pipes and traps should, where possible, be exposed to view. They should always be readily accessible for inspection and repairing.

In every building where there is a leader connected to the drain, if there are any plumbing fixtures, there must be at least one 4″ pipe extended above the roof for ventilation.

The contents of settling chamber or dust receptacle for vacuum cleaners may be discharged into a plumbing and drainage system.

Leaders must be trapped with cast-iron running traps so placed as to prevent freezing.

Rain-water leaders must not be used as soil, waste or vent pipes, nor shall any such pipe be used as a leader.

To have an intelligent understanding of what the plumber has to know, it might be well to know what certain terms are which are used in the plumbing rules.

Definitions

The term "private sewer" is applied to main sewers that are not constructed by and under the supervision of the Department of Public Works.

The term "house sewer" is applied to that part of the main drain or sewer extending from a point two feet outside of the outer front wall of the building, vault or area to its connection with public sewer, private sewer or cesspool.

The term "house drain" is applied to that part of the main horizontal drain and its branches inside the walls of the building, vault or area and extending to and connecting with the house sewer.

The term "soil line" is applied to any vertical line of pipe having outlets above the floor of first story for water closet connections.

The term "waste line" is applied to any vertical line of pipe having outlets above the first floor for fixtures other than water closet.

The term "vent pipe" is applied to any special pipe provided to ventilate the system of piping and to prevent trap siphonage and back pressure.

The Trap

Most important from the hygiene point of view is the trap, which is a curved pipe permitting the last of a flow of water to remain in the pipe to prevent a back flow of sewage gas into the house. There are for use various forms of traps under different circumstances which, of course, are entirely the plumber's business.

In hotels and large institutions, and in some large homes, a grease trap is built in the sink which is so constructed as to separate the grease from the water, which obviates clogging of the pipes and which amasses the grease which is sold to soap makers for soap.

Fresh Air Inlets and Main Traps

Fresh air inlets and main traps are also for the prevention of odors and gases coming directly from the sewer. The entrance of these gases often takes place, even though the plumbing is excellent, by the settling of the floors and foundation rendering the soil pipes defective.

The question of soil pipes, etc., is sufficiently covered by the plumbing regulations so far as not to need any explanations here.

Every sink, of course, must have its own trap.

The following are a few excerpts from the law:

Sewers, Drains and Traps

must be of extra heavy cast-iron. When found in a leaky or defective condition, shall not be repaired or replaced except with heavy cast-iron pipe.

The house drain and its branches must be of extra heavy cast-iron when underground, and of extra heavy cast-iron or galvanized wrought iron or steel when above ground.

The house-drain must properly connect with the house sewer at a point two feet outside of the outer front vault or area wall of the building. An arched or other proper opening must be provided for the drain in the wall to prevent damage by settlement.

No steam-exhaust, boiler blow-off or drip-pipe shall be connected with the house-drain. Such pipes must first discharge into a proper condensing tank, and from this a proper outlet to the house sewer outside of the building must be provided. In low pressure steam systems the condensing tank may be omitted, but the waste connections must be otherwise as above required.

Soil and Waste Lines

All main, soil, waste or vent pipes must be of iron, steel or brass.

Soil and waste pipes must have proper Y or TY branches for all fixture connections.

The diameters of soil and waste pipes must not be less than those given in the following table:

Main soil stacks . . . . . 4″
Main waste stacks . . . . . 2″
Branch wastes for slop sinks . . . . . 3″
Branch waste for kitchen sinks . . . . . 2″

Vent Pipes

All vent pipe lines and main branches must be of iron, steel or brass. They must be increased in diameter and extended above the roof as required for waste-pipes. They may be connected with the adjoining soil or waste line well above the highest fixture, but this will not be permitted when there are fixtures on more than six floors.

Branch vent pipes shall be kept above the top of all connecting fixtures, so as to prevent the use of vent pipes as soil pipes or waste-pipes. Branch vent pipes should be connected not less than six inches nor more than two feet from crown of trap or side of lead bend.

No form of trap will be permitted to be used unless it has been approved by the Superintendent of Buildings or the Board of Standards and Appeals.

No anti-siphon trap or deep-seal siphon-jet fixture shall be approved until it has successfully passed such test as may be prescribed by the Board of Standards and Appeals.

A set of not more than three wash trays may connect with a single trap, or onto the trap of an adjoining sink, provided both sink and tub waste outlets are on the same side of the waste line, and the sink is nearest the line. When so connected, the waste-pipe from the washtrays must be branched in below the water-seal.

The sizes for traps must not be less than those given in the following table:

Traps for slop sinks . . . . . 3″ in diameter
Traps for kitchen sinks . . . . . 2″ in diameter
Traps for wash-trays . . . . . 2″ in diameter

Now, of course, all the foregoing relates to the whole house as well as to the kitchen. But, as the kitchen sanitary conditions depend upon the same regimen, the foregoing is a basis for kitchen usage.

The kitchen is mainly concerned with the water supply and water waste, which is the result of cooking, washing, cleaning, and storage (refrigerator).

Sinks and Connections

The entry of water to the kitchen is effective through faucets, for the most part, in some sort of a sink. What then should these sinks be, and what should be the nature of their connections? For the most part, the building law will take care of the connections, but you should see to it that the traps are below the sinks and are in plain sight, and that the materials used, for your own good, should not only be within the law, but a little above it. Another thing you must remember, in ordering sinks, is that they should be smooth, in one piece if possible, having a seamless interior, non-absorbent, non-rusting, and with a certain amount of elasticity, so that when hit by sharp and heavy utensils, neither the utensil nor the sink is cracked or injured by the impact.

The materials to be used in the making of sinks are tin, wood, soap-stone, galvanized iron, slate, copper, enamel, enamel over iron, a porcelain-like material over metal, and solid porcelain. Stone and slate are poor because they are too absorbent. Wood is bad for the same reason. Tin rusts, copper is difficult to keep clean

and is rarely used for anything but pantry sinks. Enamel over iron is excellent, porcelain over iron is better, solid porcelain is regal but has the disadvantage of having so little resiliency that dishes are apt to break when coming too effectively in contact with it. This is often obviated in the pantry by enclosing the pantry sink in a wooden casing. The surface of good porcelain over metal will not scratch.

Second Grades

Solid porcelain sinks are all made from the same material, yet the action of fire affects some differently from others. For instance, a workman may fail to work out of the wet mould a bit of air in the clay, and when this piece is fired in the kiln the air condenses and bursts out and the result is a slight streak; or a bit of copper may get into the clay causing a green stain on the piece. When such things occur, it does not alter the value of the sink, but the high grade manufacturer marks these "second grade." This is well for you to know as it really does not effect the lasting qualities and probably the initial cost is lower. The shallower a sink is the easier, of course, it is to take care of.

The general run of sinks has the metal base with a porcelain-like covering, as they are elastic and are kind to falling china. However, you cannot go wrong in buying any of the enameled, or porcelain over iron, or the solid porcelain, bought from the well-equipped, long established manufacturies. There is one firm which makes a superb solid porcelain sink in thirteen varieties, including two vitreous (porcelain over metal) slop sinks. When you think of one firm making so many varieties, and a few other firms making almost as many, it soon becomes necessary for the domiologists to know

what to tell a plumber to install, before the masculine mind installs something for which you will have little use. Of course, it depends first on what the sink is to be used for. In large kitchens, the pot sink, vegetable sink, and slop sink are used, sometimes two of some of these varieties. In the medium kitchen, the pot sink and one of the others. In the small kitchen, just the ordinary pot sink is used.

Do not buy an all-roll sink; that is, a sink with a curved rim and no back, unless your kitchen has a tiled wall. Why? Because your wall will be splashed to the destruction point.

Very commodious sinks measure 5′ 2″ over-all, back 9″ high, wall to front, 26½″. This size sink is often in two divisions, one for washing, and one for rinsing, and has integral drain boards (of self material as part of the sink). If the integral drain board is not of wood or metal, it can be rendered kindlier to china by a rubber mat. Some sinks have a 5′2″ back, some just have a porcelain back behind the faucets.

A small sink a little over 3′ can be had with or without integral drain boards on either side, and a vent at the right end, so as not to interfere with the dishes.

Speaking of drain boards, it is very often expedient to have them hinged to the wall, or so attached to the sink that they can be let down and out of the way.

Patented Materials

Sinks of patented materials, with trade names, which are often metals with a porcelain-like covering, also come in many sizes and in many designs, and are, as inferred above, quite as valuable in usefulness and beauty as solid porcelain, with one exception, of course, that under some remote circumstance a chipping off of the material may occur. But the makers of solid

porcelain sinks make a metal-coated slop sink where an extra heavy thudding, by pails and cleaning instruments, is apt to occur. This precaution speaks for itself. The solid porcelain certainly gives you a feeling that you have the best, yet some of the greatest houses in the country use the other types of sinks.

Although we have touched upon the subject of drain boards, there are few more words to say about them.

The sink with a double drain board is, of course, the most convenient, but this is not always possible. They are made of metal, such as copper and zinc, and also of wood, either oak or ash, preferably ground ash, hard enough to prevent absorption. Sometimes they are of metal over wood. The porcelain drain board is easiest of all to clean, requiring only a moist cloth passed over the porcelain or metal under porcelain, while the others need scouring and scraping. The grooves in any of these boards must not be so deep as to require digging to remove lost particles. Most pantry sinks have the wooden drain boards and the wooden enclosed solid porcelain sinks, just to save breakage. "Boards," of course, should always be slightly tilted toward the sink.

It is wiser to have sinks 36″ high, or have them on adjustable standards.

If 36″ happens to be too high, a long wooden step can be provided. It is better to step up than to form a crick in one's back.

However, any plumber will alter the standards, no matter what sink you buy. Sinks are purchasable with from one to four standards, depending upon what space in the kitchen is to harbor said sink.

The standards of sinks are made of glass, brass, nickle plate, or porcelain, or a porcelain coating over metal. Some of these standards are supplied with adjustable bracelets, making it possible to raise and lower the sink

to desired levels. The nickle standard is very desirable, as is the brass, but they require cleaning and polishing. The glass and porcelain families need just to be rubbed down with a moist cloth.

Slop sinks are made to set lower than other sinks in order to obviate lifting up heavy pails of water, etc.

Outlets

The question of outlets in the sink is simple. The outlet should not be perforated so minutely as to prevent rapid exit of the water, and yet the holes must not be large enough to permit foreign matter to clog the pipes of the plumbing system. Very often it is wise to have a wire net over the outlet. Some sinks are equipped with stoppers and with cylindrical outlets familiar in wash basins and bath tubs. In these sinks the water is kept in until it is time to release it, obviating the necessity of wash basins. Sunken outlets are a nuisance to keep clean.

Faucets

Faucets are usually of metal, and high priced ones are of enamel. Some sinks have two sets of faucets, two in each set. Some have a higher faucet, a goose neck pattern, for filling carafes. The metal faucets are generally brass and nickel plated. Brass corrodes and is hard to keep clean. The nickel are very satisfactory but cost more. The enamel are quite ideal because the polishing is absolutely obviated. In this case it is a toss-up to the purchaser what it is best to save—time or money. Then there is the pressure faucet—the one which has to be held in order to get water out of it. These are quite hateful and ought never to be used unless the water price is almost prohibitive. Sometimes

a foot pressure faucet is used in order that the worker may have his hands free for work. A new faucet which can be swung into different positions is to be had on the new pantry sinks.

If the water pressure is extraordinarily high, try to get faucets on your sink with air chambers to take care of this extra pressure. And try, above all things, to buy faucets that emit a flow of water which does not splash the worker.

Unless you are a skilled mechanic, don't try even to put a new washer in your faucet to stop a leak. Because, unless you are skilled, you may forget to shut the stop-cock which cuts off the sink from the main water supply, which may be under the sink or in the cellar.

And to prevent a woeful catastrophy, don't forget, if you leave your house unheated in the winter, to turn off the water in the cellar.

Filters

The question of filters, (See Chapter XXXII, Polishing The Water Supply) which are attached to faucets, is full of danger, as there are only a few good ones on the market, and those that are good can be rendered, through careless handling, much more of a menace than the ordinary water supplied to you. The porcelain-like candle type is one of the best but not absolutely fool-proof. The water sifts and filters through this porcelain candle. If this is sent away to be thoroughly baked, at regular intervals, according to the manufacturer's description, it is useful; but, when this is not done, the filter becomes a breeding place for germs. Therefore, all things being unequal, boiled water is the safest insurance against germs.

As for the refrigerator's (See Chapter XI Refrigerators) rôle, in the plumbing of the kitchen: this

is, of course, very important and very simple. It is necessary to keep noxious gases from the stored food. If possible, have a connection through the floor with the trap and pan in the cellar. If this is impossible, have a trap and pan under the refrigerator which can be often emptied. It is, of course, convenient to have the ice box filled from the outside of the house rather than have the ice dragged through the kitchen.

These are some excerpts from the plumbing code:

Safe and Refrigerator Waste-Pipes

Safe and refrigerator waste-pipes must be of galvanized iron, and be not less than 1¼″ in diameter nor larger than 1½″ in diameter with pipe branches at least 1″ in diameter with strainers over each inlet.

Safe and refrigerator waste-pipes shall not be trapped. They must discharge over a properly water-supplied, trapped sink, with trap vented unless an approved anti-siphon trap is installed in the manner specified in Rule 91, such sink to be publicly placed, and not more than 4′ above the floor. In no case shall any refrigerator or safe waste-pipe discharge over a sink be located in a room used for living purposes.

The branches on vertical lines must be made by Y or TY fittings and carried up to the safe with as much pitch as possible.

Where there is an offset on a refrigerator waste-pipe in the cellar, there must be cleanouts to control the horizontal parts of the pipe.

In all lodgings and tenement houses the safe and refrigerator waste-pipes must extend above the roof.

Homilies

When I started to write this article I thought I would give specific plumbing rules, but the buying of fixtures is really all that is necessary for the housewife to know, as all first class plumbers know the rules of the code. So the best plan to adopt is to use the best plumber. Even if he be expensive, he will save your money in the end. And remember, always use one in your vicinity for, if you do not, you will be very unpopular, as you will know when some dire emergency emerges!

If your pipes freeze in the winter, warm cloths until the plumber comes is the best remedy.

If you build in a remote district, have your water tested by an expert on the spot, so that he can examine not only the water, but the source of its supply, and help you in settling where to build your well or pump, and where the cistern should go, etc., etc.

After a new installation of plumbing is made, there is applied always a test like the peppermint smoke test, etc., to see if there are any leaks in the pipes. This is also accounted for in the plumbing code.

Athough not quite technically a plumbing fixture, there is a ventilating, self-cooled motor propellor fan, which is being put up in kitchens, to keep the kitchen cool in summer, and to remove traces of excessive heat, steam smoke, and objectionable odors.

CHAPTER XVI

KNIFE-LIFE IN THE KITCHEN

"I WOULD like to have a vegetable knife," says a woman to the salesman.

"Yes, Madam," says he, handing her a knife.

"Thank you," says the customer, not even looking at it. Then she goes home and tries to pare a pumpkin with the dainty little flexible knife that she has bought and finds that the task is quite impossible. Why? Because she has used a knife not designed at all for anything but a potato or an apple.

Such things are very frequent because the purchaser doesn't realize that "vegetable knife" as well as "motor car" spells many types, and that the knife is even more diversified in design than the car to meet various kinds of work. What carpenter would think of cutting across the grain with a plane meant for cutting with the grain? The carpenter realizes the range of design in his tools, however. So should it be with women if they wish to save their nerves, their hands and their time and make their food look worthy of its cost.

The background of the knife and fork is surrounded with historic significance and romance. The knife seems to be the first-born of Father Cutlery and the fork a late development as a table essential; and the spoon comes so late that it isn't even romantic.

First of all, cutlery was developed from the hunting knife in various guises. Then it became the sword of history. Not until the Middle Ages were knives used

on the table, and then only one or two. Not until two or three hundred years ago were they used by each individual! And this first took place in Italy.

Ordinary cutlery was really first used in the form of the sheep shears, very much like the shears used in the Rembrandt painting: The Old Woman Cutting Her Nails.

Before steel was used, bamboo, shell, then copper, bronze, tin and copper and the so-called "steel" of Damascus were the materials out of which the knives and swords were built.

As forks were a later development and were used at first only as a means of helping the diners from the central dish, it was necessary for the diners to wear gloves to shield them from the rigors of hot foods. Therefore, with such methods it was necessary to recover in sanitary fashion and to this end servitors would meet each diner with a bowl of water and a towel. Thus has the finger bowl descended unto us.

For some time after the knife and fork were used generally, each person would carry his own beautiful set in a handsome case at his belt or girdle. During the 18th Century when the fork was commonly used it was with the knife superbly fashioned of jewels and metal work. For the most part forks were two pronged, and not until Louis XV of France did the four-tine fork come into being.

So from the hunting knife and the crotched wooden stick was born our own diversified cutlery. Not only in steel of fine temper and hardness, but recently of steel with the added qualities of stainlessness.

Although Sheffield, England, in the past has the reputation for the finest cutlery in the world, and although Sheffield must be given the credit for fathering the craft, yet the United States to-day is making some of the

best cutlery and bids fair to outmake and outsell the world in quantity and quality.

Kitchen Cutlery

The subject of kitchen cutlery, the one which this chapter is dealing with, does not interest itself in silver plate and all the cutlery so beautifully made for table use. The same general principals apply, but there is too little space here to go into the detail of pattern, brands and general details of table cutlery.

However, the blades for most cutting articles are made of shear steel, and for this crucible cast steel and forged steel are used.

The essential parts of the process of cutlery making are: (1) forging; (2) hardening and tempering; (3) grinding; (4) polishing; (5) assembling, honing and the finishing touches; and these are subdivided into many divisions, making nearly a hundred in some instances and more in others.

The last division is the one which the "cutler" does to-day. In the 18th Century the cutler did the whole work of making a knife, but to-day the polisher polishes and the grinder grinds, etc. The hundreds of processes to-day in the course of the manufacture of one piece of cutlery are in the hands of nearly as many workmen.

Of course, the value of modern cutlery is in the finesse of manufacture and the quality of steel that is used, and in the perfection of its varying parts and their assembling.

Knives are meant to cut.

Knives, therefore, must be so made that they will keep their cutting edges, so proportioned as to fit the thing to be cut; so limber or so stiff as to be comfortably wielded; so assembled as to keep their handles fastened to them; and so balanced (even as a golf club) as to be

not only easy but pleasant to use. Pleasant tools make light work.

The knife has three or four main parts—the blade; the tang (that part which fits into the handle); the handle itself, or haft, as it is sometimes called; and in some cases a metal ferrule. Much depends upon the way these parts are made and fitted; they must be so married that nothing can divorce the knife from the handle, so that they will preserve their oneness indefinitely. The great Reno for the knife is the huddled drawer in which it is for the most part kept, but more of this later.

Variety in Knife-Life

The kinds of knife in which the housewife is particularly interested are: carvers, vegetable slicers, parers, fruit, cleavers, etc. Subdivided, they are: paring, bread, meat, poultry, carving, cake, boning, paring (small pocket type style), spatula, lemon, grape and orange, curved in French, German and American fashions, cleavers and scrapers.

Where it is necessary for a knife to conform to shape in paring, a flexible knife is more comfortable than a stiff one. Therefore, if you want a vegetable knife for slicing potatoes never think of buying a long stiff one because your work will be seriously impeded. If you have the right tool the job of paring, or what not, will be as much fun as carving is for the artist who in his turn always has the correct tool.

"Gracious, I can never slice a ham that doesn't look as if some one bit it up," said a friend of mine.

As gently as I could I told her it was because she was trying to do the impossible. She used a knife for bread and cake, broad and short, and expected it to do the work of a long, thin blade slightly curved off at the

end. The heavy, wide-bladed knife cleaves to the surface of the meat and makes it a practical impossibility for any ordinary mortal to push it through. The narrow blade is what you must have, as it requires less strength and cuts therefore more efficiently. The knife with the almost scimitar formation makes it simple to cut around a bone.

Most everybody has a bread knife, so we need not bother about that familiar object, but the only thing necessary is that the bread knife should be kept for bread (and kept sharp) as far as possible, unless it is adapted by having a medium wide blade, to cut meat and cake.

For hot meats a rather flexible, but not too flexible, knife should be used, especially in the case of hot steaks and ham. It is a real comfort to have a good knife for these things; the meat is not chewed before its time and is not wasted in formless gobs.

For the person who must economize on the number of utensils, a knife about 8″ or 9″ long with rather wide blade can be bought which can very comfortably be used for cold meat slicing as well as bread and cake. A set of six knives, two spatulas and two forks, will fill most kitchens needs. Other knives and forks can be added as specials. Here is the 2″ paring knife, 3″ for splitting. The general household keeps a fork with the French pattern blade for general work and the heavy 6″ blade for cutting vegetables such as turnips, pumpkins, squashes, etc., where a thin blade would snap; the fork has hardened blades with needle points. The spatula for pastry works as well as the wide spatula. The carving knife in 8″ short blade, and the flexible slicing knife with 9″ blade usable for cold meats, cake, bread, etc., and the general utility knife.

For tough cutting and broad surfaces the narrow,

stiff knife is best, for crumbly broad surfaces the broad, stiff knife. For rather tough, small surfaces, to be pared and trimmed, the medium flexible, narrow blade is best. Use the narrow and stiff and short knife for tough small surfaces like squash and turnips. With these simple logical suggestions the knife problem is easy.

"Had I only learned the use of the spatula in cooking school I should have thought my course to be a lifelong economy." This was said somewhat in jest, but it shows just what the value of the spatula is. It is an economy. It is not a cutter but a very flexible, bendy blade with round corners which can assume the curve of any vessel and pick up dough or anything left behind in bowl or pastry board which is worth saving. It is a scraper and saver. You need not waste a bit of the precious egg on the sides of your dish or a bit of batter if you use the spatula. It also lifts comfortably the egg, griddle cake, fish etc., from the pan. It is really a joy unbounded.

A larger sized spatula is a convenience, too, for scraping and cleaning large kettles and also for a cake or pie lifter. Being larger it is a trifle stiffer. One corner of the end of this blade is sharp and the opposite corner is round. The reasons are obviously for attacking corners and not scratching surfaces.

Home Butchering

In some homes a certain amount of butchering is done in the kitchen, sometimes to save expense and sometimes for certain and very fine results if the chef is a jewel.

To this end there are some good implements on the market: strong, well balanced and riveted to give good service. Knife blades for this work range from 5″ to 14″ in length and are in various styles.

The cleaver is a good thing to have should the butcher sometimes neglect to break a furtive bone. These come in pleasant weights and dimensions, the one with blade 6″ long by 2½″ wide, weighing in all one pound.

In connection with knives for fruits and vegetables you will be interested in the story of the late product of steel which is so fast coming to the markets of the world. It is stainless steel. A steel (with an admixture of chromium) which resists rust, does not corrode or scale, and is impervious to food acids (with the exception of the mustard plus vinegar plus salt combination which makes a muriatic acid, which is the acid with which steel is etched).

It keeps a fine edge and is of fine temper and hardness when made by accomplished manufacturers. The steel you use now is a carbon steel. Before the war, both in England and America, it was rapidly coming into our markets, but the value of such steel was so patent to governments that the war and construction departments used it all. Now, however, it can be bought even in some department stores.

Think of not having to scour or polish your knives. Think of the knife having an indefinite life and always looking highly polished. Soon, too, even the handle will be made of this steel and the knife will look like a highly polished silver utensil.

What may this mean in a servantless home?

No cleaning powders must be used to clean this steel; only warm water and a mild soap. Its advent reminds you of the early days of aluminum utensils, doesn't it? The manufacturers are planning to make kettles, pots, and pans of it, as they will wear well, and will not scale and wear as do iron ones.

As this steel is non-staining, the hands are not stained as much when it is used with fruit juices; the factor of

the juice combining with the elements in the steel is absent. There are some people whose hands stain from certain juices whereas the hands of others do not, but generally speaking, there will be less hand staining with this newer steel.

If you do your own work, how your hands will be saved!

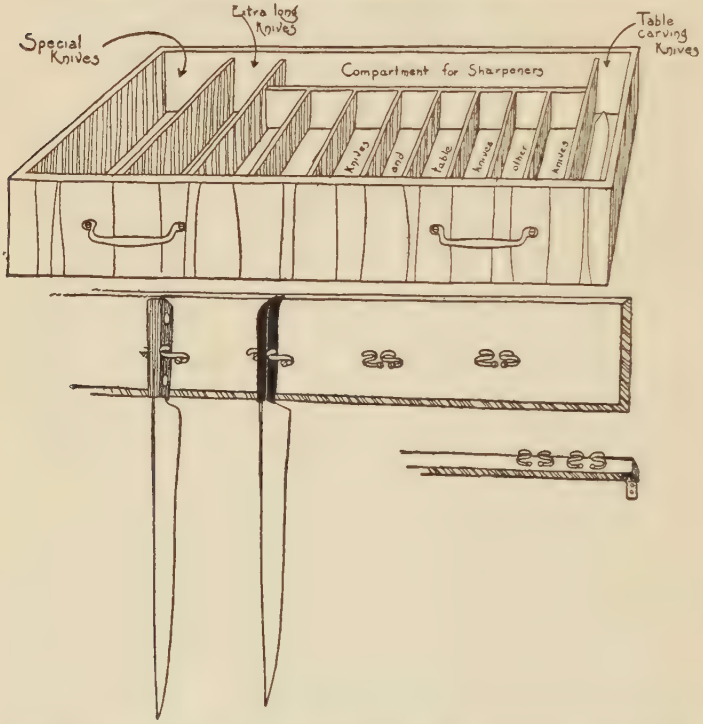
The few years of its service may not have revealed all of its good points or some of its bad points. Only time will tell, of course. But as a fruit knife at present the stainless type seems to be a fine thing, though the ordinary steel knife, if sharp and well made, is no less of a joy than ever it was. Manufacturers are adopting the stainless—even those who think that it isn't as good as it is claimed to be.

Vegetable and fruit slicers and parers come in many sizes and styles. They are usually small and light with narrow blades and sharp. They are to be had in stainless and carbon steel in sets and in singles, and when bought wisely make the kitchen maids' job an artistic one.

Grape-fruits and oranges have knives for their very own. Manufacturers have given much time and thought to the easiest method of preparing these fruits easily, without loss of juices and flavor, and without waste of time on the part of the operator. And so there have been born a few of these knives which are excellent and live up to their glowing advertisements.

Their characteristics are: Two-edged, like the great swords of old. They cut from either the right or left with ease; the blade is curved to fit the fruit and has rounded points so as not to lacerate the outer skin and waste the juices and spoil the shape of the fruit. The blade is exceedingly sharp and honed carefully like a razor—the sharper it is the swifter it will do its work.

The blade must be securely fastened in the handle. The handle must be light, of comfortable shape and well balanced. In a few words, the knife must be able to get



DEVICES DESIGNED BY THE AUTHOR FOR KEEPING CUTLERY IN CUTTING FORM

down and under the center, cutting the side segments as well as making the tough walls "fade away" easily.

The knives are made in stainless steel, in nickel-plated steel and in the ordinary and fine vanadium steel. Your

fruit when prepared with such a knife may look as if hands never touched it.

Handles

The question of handles is interesting because the knife without the handle, however sharp it may be, is of little use. The main question is of ease in gripping, in the balance, and in the duration of time that the blade will stay firm in the handle.

There are many ways of accomplishing these things: in some cases the tang of the blade is cemented in the handle. This is done where the knife is used with little pressure and strength, such as the feather-curling knife of the milliner; there are some knives which are riveted such as butchers' knives because much force is used with them; household knives are pinned and pinned and cemented sometimes, and in the case of home butcher knives as many as three pins are used to keep the handle steady.

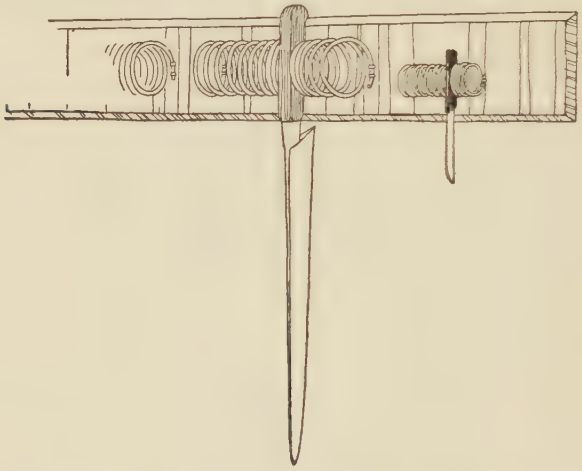
With knives like the corrugated types, there are often metal wire handles drawn out on them. The corrugations on these blades are to obviate tearing and reduce, some think, the pressure necessary in cutting.

Handles themselves are made of various things,—woods, rubberoid, celluloid, metals, stag and in the case of table knives, mother-of-pearl, shell, silver over nickel, etc.

The kitchen knife handle must be able to stand all heats, be impervious to hot water, be smooth and comfortable in shape, and must be nicely finished so as to give the worker a feeling of worth-whileness in his job. Sloppy tools make for sloppy work. Think of your cutlery as the dentist does his tools and you will feel professional.

The housewife errs in no place quite so much as in the care of her cutlery. In nine and one-half houses out of ten the good blades are huddled and hustled into a drawer where they loosen from their handles, nick, scratch and hammer each other to their own destruction. What good is there in having good materials if they are to be stored in this manner?

Consider the carpenter how he stores! He hangs



ANOTHER DEVICE DESIGNED BY THE AUTHOR FOR KEEPING CUTLERY IN CUTTING FORM

each tool in a certain groove, and as he desires a certain thing he extracts it. He can't afford to have auto-destruction—it is too extravagant a disease. Yet it is the hardest thing in the world to make the housewife hang up her few knives and keep them forever in good shape.

Clean them after every using. It's easier then. A little scouring powder now and then will keep them in condition. Do not use scouring powders with stainless

steel, as it reduces the polish—the very thing which maintains its imperviousness to stain.

All new knives should be so finished when you buy them that they need no further edging. The best manufacturers see to this and have a department just to hone and make knives ready for use.

Sharpening

The housewife's best method of sharpening or rather keeping the edges straight and keenly cutting is the steel. When the knife really gets dull it should be ground. The use of the stone or carborundum by the ordinary operator often wears the steel. However, if the use of the grinder or the stone or the carborundum is really known, time and money will be saved in the sharpening process. Sharp knives save temper, save food to a great degree, and therefore if you can't sharpen knives yourself send them out to be taken care of once or twice a year.

There is a special stone on the market for stainless steel sharpening; it is well to get this for your stainless utensils. Follow the directions with it carefully.

All sharpening steels should have a guard for the hand in case the knife slides back towards the fingers.

Never hold the knife on edge on the steel, for it should be quite flat; remember you are trying to flatten the two sides toward the edge, and thereby make it a better cutter.

There are good rotary grinders and polishers on the market, and knowledge of them and their use is very valuable. There are also stones flat and stones in handles, all for keeping knives sharp. They are yours if you want them and realize that you must know how to use them to save rather than to destroy your cutlery.

The story of forks is almost the same as that of its confrères, knives.

The tines must be rigid and sharp enough to pierce immediately and not drop their prey by dull points.

Forks were not meant to open cans or lift lids. Many a perfect fork has had its life history snapped by this usage.

As with the sharpening steel, so with the fork which accompanies the carving knife—it too should have a guard to prevent the knife slipping and injuring the left hand.

If you buy the best cutlery from the most representative firms you will have the best results and be well repaid. Good cutlery, like everything good, is more expensive than the cheap varieties. Good cutlery may stand up longer under bad usage than poor cutlery; but don't tempt it and waste your money!

A little care with cutlery will curtail your bills, give your food a better appearance and swifter accomplishment, for, after all, the kitchen work is mostly cutting up.

CHAPTER XVII

THE ANCIENT WOOD IMPLEMENTS

IN these days of metals, electricity and enamels, you are very prone to forget that there is still virtue in the ancient wood, which with true aristocratic gentleness, has given way to those more parvenu products that boast their sanitary qualities.

To-day there are still things of wood for the kitchen, pantry and laundry which are retained to advantage and other things which can be kept, if not with advantage, at least for utility.

Some purchasers have wasted time in their zeal to kill entirely the wood tradition and substitute metals in every instance. To save this time, this article is written and dedicated to you who would have the right thing, be it of the darker ages or of this so-called sanitary or enlightened era.

For example, could you ever use a metal plank for planked fish or meats? Of course not! The wood itself in this case gives up its own essence as it combines, through the medium of heat, with the juices of the food cooked on its surface. What metal could do this without imparting the metallic taste to the bill of fare?

These planks come in different sizes and shapes. The best are of oak. Some cost more than others. But the thing to remember is that a plank is like wine, the older it is, that is, the more it is used and becomes impregnated with the empyreumatic flavors of the food stuffs,

the more exquisite become its quality and the better flavor it imparts to the food.

According to Nicholas Sabatini, Chef of Delmonico's the best thing to do with a plank when you buy it is to keep it for at least six weeks, to be sure that it is seasoned sufficiently. After using a plank, do not soak it in water, but clean it off with a damp cloth only. Then keep it under a weight of some sort to prevent any probable warping of the wood. Mr. Sabatini was very insistent about the plank being of oak, as any other wood imparts too definite a flavor of its own to the food stuffs cooked on it.

Ironing boards have never been replaced with metal to any large extent. It is their "give" when swathed in "white stuff" that makes them comforting and usable. Even the modern bracketed ironing boards are wooden with the exception of their metal joints and arms, enabling them to be folded against the walls or put out of the way. So, too, the sleeve and skirt board. Time would be wasted in hunting for a more modern material to use for these staples.

Ironing folding tables are neat little things for the small house. These are made of white wood. They will not last a lifetime but they are inexpensive and useful.

Skirt boards come from 3′ to 6′ long and the sleeve board around 18″ to 20″ long.

In some cases where there is available both a wooden article and a china or metal, it is often better to get the non-wooden. For example, the wooden salt box; good enough in its way but it is out-ranked by the china, porcelain or composition boxes, because these materials look better, wear better and cannot help being smoother and less fibrous than the wooden variety. So would you rather buy sharpeners, flour sieves, some of the

pot racks and sink racks in metal garb than wood, although there are some sink racks of wood which not only have a porcelain lining but save breakage of china.

Chopping bowls of sugar maple (not southern maple) are kitchen necessities. These do not splinter and they make the din of chopping less obnoxious. The rotary chopping machine is not always analogous to the chopping bowl, for who could chop parsely as well in a chopper as with blade and bowl?

Wooden bread boards and cake boards, of course, are invaluable (pie "boards" are better of marble, porcelain or their cognates). These must be of hard wood such as maple or birch and so made as to be knotless, crackless and long grained. A damp cloth will remove traces of material used thereon.

The onion should have its own little chopping board for obvious reasons.

Noodle boards are oblong, usually of white wood and come from 14″x20″ to 20″x30″. These have a descending ledge at the near side to hold fast to the table and an ascending ledge on the far side to keep the dough from sliding off. Bread boards are round and are from 10″ to 11″ in diameter. Pastry boards can be had from 12″x16″ to 20″x30″.

The wooden step, non-rickety and solid, is of inestimable value in the kitchen where the worker is too short for the tables or tubs, or where things must needs be on high shelves. The step chair which readily is changed from ladder to chair combines a 2-in-1 arrangement, that makes room in a kitchen by obviating extra chairs and extra space for a pair of steps or ladder.

We would warn purchasers against the salesman of wood garbage buckets or pails. In no case are they as sanitary as regular metal containers.

But the oak pail, keg or bucket for cider, vinegar,

preserves or water is a good culinary adjunct. They are hard, firm and well constructed in the best makes. Often these things have been quite forgotten and yet they are quite useful in kitchen economy.

Wooden pails come for various uses—scrubbing pails, water pails, jelly pails and flour pails. They are made with two or three hoops and are of pine, cedar, oak grain or oak. The flour pails hold from 12½ to 50 pounds of flour. The jelly pails hold from 5 to 30 pounds of jelly and are a convenience to the house-keeper who puts up a lot at a time and who has a large menage.

The large wooden spoon for use in acid cookery—preserves and the like—is indispensable to the epicurean household and should be on every kitchen utensil list.

The clothes-horse is practically an extinct animal. In its place has come a different species of varying kinds. Some fold up against the wall, some are pulleyed up to the ceiling and get the ascending heat of the room for drying and some don't fold at all. Some are built for porch use, garden use and roof use. But all are less aggressive than the extinct "horse."

A close relation to the clothes rack is the towel rack and hand towel roller, usually of wood and made as well of this material as any other.

The bread and pastry roller is usually of wood and is quite efficient. There are glass rollers on the market but, of course, these can chip. Special noodle rollers are made now of maple and birch and are long and thin, giving quick contact like a low gear! Some rollers have designs cut in them for finishing off a bit of dough with a pattern.

Potato, slaw and bread cutters are merely wood receptacles with cutting blade insertions.

Knife drawers or racks with grooves to keep the

knife blade inviolate are too little used. This is one of the things that will make the kitchen a more proper tool chest, prolong the life of cutlery and save time in the search for wanted knives on the part of the worker. These are being made in compact, useful fashion to meet the needs of the well ordered kitchen. We can't stress the housing of cutlery hard enough—and it is a real housing problem.

The pot cover rack for those who do not hang up their pots is a great comfort. It is inexpensive and easily installed. With these cover racks you easily identify the cover and it doesn't get lost in a dark closet, although many folks think quite the contrary and deplore the newer methods of hanging up pots and their covers to the public gaze.

The question of serving butter delightfully is taken care of by keeping it in the ice box in a stone crock, and making butter balls with little wooden butter pats. There are also wooden butter prints, which enable one to serve butter in forms with a probable little raised design on its top surface. These come in a flattened butter ball size and also in ½-pound print moulds.

The question of wood in the kitchen becomes acute in the handle situation. Brushes, brooms and mops of all kinds have wooden handles, and the handle makes for comfort and comfort for efficiency. Therefore it is not out of place here to give a few suggestions as to what a handle ought to be:

1. Smooth—no splinters—hard non-porous.
2. Easily held in hand (if on scrubbing brush, sink brush, etc.).
3. Long enough to do the work (if on wall or ceiling or radiator brush).
4. Set firmly in its socket and easily set in (if on mop, wall brush, etc.).

5. Non-snapping, not brittle (if on a wall duster).
6. Enameled to resist heat and water.

The mallet and the potato masher are heavy tools and quite necessary. The former is usually of hickory or lignum vitae, the latter of maple. The potato masher's function is obvious, but the mallet is often needed for cracking a bone, or ice. For fixing lobster and making a chicken go a long way a mallet is quite a little "fixer."

The coffee mill and the sink rack can be as well made of wood as of metal. Yet this does not need to preclude the metal ones for those wanting them. The wooden ones themselves are really more of hardware than of wood.

The mouse trap of wood used once and then to be thrown out is rather a pleasanter idea than using the same impregnated trap over and over again. These are cheap and ready to use at any time.

The wooden salad set, knife, spoon, fork, are rather epicurean but seem to be passing out of fashion.

Tables of wood are so common that they need little description, yet a few suggestions may be of real value. The table with the stove is all important in the kitchen. It is so valuable, indeed, that it has been lately combined with the dish-washer and the effete refrigerator in order to make it possible in limited spaces to install these quite noble but less royal things.

Tersely said, the table must be large enough for the work to be done, steady on its legs, simple in construction and easily kept clean and wholly sanitary.

If possible metal capped legs will prevent the legs becoming unlevel by swelling when the floor is washed or shifting through general use. The table top would easily take a whole story; the main requisite is that it be hard, easily cleaned and scraped—be it of wood, composition, marble, metal or of the porcelain family.

Kitchen tables 3′ to 7′ long, with and without shelves beneath and also with or without closets and drawers below.

The wooden top of maple is most satisfactory and probably, of all the table tops, most used. Yet for those that can afford the wooden table with marble top and German silver trimmings, nothing could be more perfect even though the price soars.

Finally, if there be benefit in this article take from it suggestions for the wooden wedding gift. Few people think of the kitchen as a realm for gifts. In our experience presents of culinary use have been a boon to many householders, especially at the wooden wedding period.

CHAPTER XVIII

GLASS WEAR

GLASS ware is now no longer for ornament alone, but for cooking uses as well.

The only way to tell if you have a good piece of glass or not is to compare it to other pieces for color and sound. If it sounds clear and bell-like, it is pretty sure to be a good bit of glass. But don't strike it if it happens to be in a groove or it will, of course, shatter it, as the pieces will have no room to vibrate and will break the bounds.

Annealing

Annealing is the process brought to such a perfection to-day that glass can be made almost shell proof. In fact glass for automobile windows was and is being made that when it is struck will not shatter but will simply crack or craze. This process is one of careful heating and cooling many times repeated. It makes the glass more elastic so that the particles are in more of a state of equilibrium and can be struck without danger of breaking.

Manufacture

The basis of all glass is soda, aluminum or oxide of lead in combination with silica of sand. Doesn't this sound hiphalutin? Well, it isn't. Then this is heated to something like 1200 degrees Fahrenheit and when in

molten form is blown with air incorporators into the requisite shapes. You no doubt have seen glass blown at bazaars or fairs. But of course this blowing in the factory is done with huge blowers. The best glass is dependent on its base as it is combined with lead. This combination is the fine glass called flint glass. And it is from flint glass which has the luster that the cut and engraved glass is made.

Color

The color in glass is given to it by the use of metal oxides. blue is derived from copper oxide, yellow from iron oxide, the stunning reds from gold. Don't these facts, make glass more interesting to you?

Rock crystal is the fashion now and probably will persist. But don't, for goodness' sake, be untechnical enough to say anything but polished engraved glass, when you speak of it! The old time glass with intersecting canyons cut in it which left tell tale gouges in one's fingers, is dead and if you use it you are dead too! Now be it remembered, it's polished engraved alias rock crystal.

How it Differs from Cut Glass

Cut glass is decorated with geometric lines by means of steel wheels and carborundum used for the cutting. Then these lines are smoothed with stone wheels and given a high polish. Some manufacturers press in the design by putting the glass into moulds in its moulten state, but this makes the cheaper glass commonly called Pressed to imitate the cut variety. Then the glass is cooled and the effects are often good enough to fool the ordinary person. Cut glass can always be distinguished from the pressed by feeling the inside of the cutting,

where it is the deepest, and if there is a slight lump corresponding to the cutting it is surely cut and not pressed.

Engraved glass is thinner than the cut glass very often and is decorated by copper wheels fed with emery and oil, which does not cut so deep. The skill of the designer and workman are the only limits to the beauty of this glass. This kind of decoration is left in the satin gray finish with the exception of the polishing out of the centers of the flowers, and other figures according to the taste of the engraver. This gives the contrasts in gray and clear glass which give the tonal value to the glass. And when the engraving is sunk deeply and then polished, it is called rock crystal because it has the peculiar colorless mat-finish brilliancy of the natural rock crystal.

Colored Glass

What about colored glass? There is much of it about, some of it the frank imitation of the old stuff and some of it the real old thing. It is very popular. The reason it isn't epidemic is because one has to have all the fixings with it to use it well and to be *au fait*. Unless one has center pieces and side dishes and flowers and, to go even to extremes, old chairs and antique refectory tables, colored glass gives a vagrant restless spotty cast to the table! You know what it means to have everything *en rapport*, in the way of expenses and fussing these days! . . . to the majority of people anyway. And so when colored glass is used, even if one has all the articles necessary, real vision must be employed and discrimination exercised in massing everything to give the ease and grace (the basis of beauty) necessary.

One of the most interesting things about glass today is that a firm in America has been taking the *Grand*

Prix and the Gold Medal in a competition with the glass-makers of the world in Paris! And some of the best glass is made in little old America! Talk about American prowess! And too, because the foreign markets have not been able to make the rather staple enamel and gold glass, America has again stepped in, and has been engaged in making this sort of glass too, and making it well.

Some very old and exclusive dealers say colored glass is not in vogue because these firms have in their clientele very selected people who probably do not buy it as they have inherited all they need. Furthermore, many of their clients don't want to be bothered with it. But from the way colored glass has been selling in some places it is certainly safe to say it is very popular. Yet on the other hand many dealers are afraid to stock up heavily with it because they fear a slump. At any rate, the manufacturers can hardly keep up with the demand for their excellent reproductions of the old Scotch, English, Irish and Venetian glass. But many hostesses like it because it takes such taste and skill to assemble a table when it is used.

Cooking Glass

No other utensils on the market combine as these do, beauty, durability, economy and cleanliness even if the initial cost is more. You see they save fuel, because they cook food more rapidly, they save the cook's time and the waitress's time because they save the cooking time, and because they are easy to clean, collecting no burn to be forced off and no food to be laboriously scraped away. Besides all this, the food can be served directly from the stove without putting it into another dish for the table. This saves more time and in-

sures hot food. It doesn't crack in the oven, it comes in many styles—it is not inexpensive but it is worth the outlay.

Plate-Glass

Of late, plate-glass has been taking an important part in the household.

This glass differs from other glass in the way it is made. In short it is spread over iron tables in a molten state and cut and trimmed to measure. It is made more carefully than other flat glass and of the finest material. It is, of course, very carefully annealed to make it as soft and as little brittle as possible.

For the tops of bureaus, dressing tables, desks, shelves, medicine cabinets, etc., it has no equal. It is easy to clean and protects what is under it. Many are using it now for the tops of dining tables and sideboards and serving tables. This is a good way to protect the table and save laundry as beautiful linens shine through the glass and yet do not soil so readily. The same can be said of the glassed bureau scarf and the dressing table where so much may be spilled.

Some people who do their own work like plate-glass for the kitchen table. As yet we feel that the brittleness of plate-glass makes the kitchen table a little too temporary, yet while it lasts it is a comfort for pastry work as well as for anything else.

For the motor it reduces danger in driving, and looks better. For the house doors and windows it adds 90 per cent. to the elegance of the lay-out.

CHAPTER XIX

THE BRIDE'S KITCHEN

WE moderns are so up to date that although we expect our women to marry they know less of the kitchen needs and the infant's psychology than of the constituencies of the planets' atmospheres. So to correct some of the deficiencies we are going to list in this article the prices of the necessities of the bride's kitchen at the present, which you must remember are subject to daily change and can only give you approximate values as this book reaches you months after the data is collected.

To-day prices veer so rapidly that we can only hope that they will not veer upward before your kindly eye peruses these pages.

Whether you use electricity, oil, gas, or wood should be part of the determining factors in buying utensils. For this reason we will, as far as possible, designate the special uses of these utensils whenever possible or necessary.

May it be said at the start that aluminum and enamel (best quality) can be used on any stove. Aluminum is more expensive but doesn't blacken up on the stove and lives longer than enamels. We will not take up copper, as it is too heavy and costly for the ordinary kitchen and takes too much labor to keep in the brightened condition in which it should be kept.

We favor glass whenever it can be substituted for kitchen utensils as the most ideal oven utensil. If your purse can stand it and its initial expense, it will save fuel, time and energy in the end and therefore money.

The Lists

Our omissions in this listing in any case are due to personal experience and choice and also to a feeling that there are many things that can be omitted when the kitchen is started and be put in later when exigencies appear and the income is greater.

We have purposely not added up the list to get an aggregate expenditure as it would mean little when cheaper or more expensive materials can be substituted. Therefore we have given but the individual costs which can be combined in the ways you desire. Thus the list is meant to be a nomenclature rather than a hard and fast formula, a *vade mecum* rather than a crystallized rule of thumb.

You may consider some things unnecessary in these lists. Again, the list is a personal compilation, as lists are as yet not machine-made, and the maker has considered what are the essentials to culinary habits.

Nor have we mentioned stoves as a consideration of the first tool chest, because the architect or the landlord in many cases has decided this for you. If you need to purchase a stove your choice is usually bounded by the kind of fuel which is cheapest in the place your spouse has necessarily to live.

So, although utensils, are dependent on the stove and stoves on utensils, we have omitted the stove here but if you read chapters VI, VII, VIII you will get data on ranges and can find out from the manufacturers the present cost.

Cabinets and Conveniences

Were we fitting out a kitchen we would either buy a kitchen cabinet or have one built in the home of the

steel unit type. We have not included it in the list for fear of being too commanding, and it can be dispensed with if the shelving and hanging room is sufficent; though we venture to say not quite so delightful will be the kitchen atmosphere without one. The kitchen cabinet in steel costs from about $92 upward; in wood $89 up.

Devices on which to hang the pots and pans and house the knives in frictionless positions are, too, omitted, because these things vary in price with carpentering and the amount necessary to spend in room and money. It is the only way to house utensils . . . in the open air where they are visible and where the arm can reach and where the back is not unrelentingly and unnecessarily bent in the performance of the manifold duties of kitchen usage.

The ice-cream freezer is not included as this is not an essential, unless you think it to be one. It is to be had in a two-quart measure from about $4.90 upward, and the gallon is available at $7.50.

In some instances we have put an article under two heads; trays, for example. This is done to show you that the two articles in aluminum or tin are equally useful and if the cheaper grade is desirable it is a safe "buy."

The grapefruit knife may be a glaring omission—we hope it is. Yet as it is not strictly necessary we have omitted it. If this little joy is bought, the stainless steel is the best material in which to look for it. It costs about 75 cents. And as soon as the purse is large enough and the manufacturers have come to the point, stainless steel is the best in which to buy nearly every bit of cutlery, as it requires little attention and neither rusts nor stains.

Here follow the lists:

UTENSILS IN ALUMINUM

Tea kettle, 3 qts.	$6.15
Quart measure	2.00
Double boiler, 2 qts.	4.05
Funnel	.90
Ladle	2.25
Pie plate, shallow	.53
Pie plate, deep	.62
Sauce pans, 1 qt. (These have covers)	1.40
Sauce pans, 2 qts. (These have covers)	2.00
Sauce pans, 6 qts. (These have covers)	3.75
Kettle covers, extra	
1 qt.	.25
2 qts.	.44
6 qts.	.62
Pitcher	7.85
Baking dish	1.30
Measuring cup	.60
Dripping pan	2.95
Frying pan	3.60
Griddle	5.55
Roaster	7.20
Angel caker.	1.85
Bread pans.	1.15
Cake pans.	1.60
2 Muffiners, 6 cups.	1.65
Steamer—fits kettle.	3.15
Trays	$2.55, 3.20
Jelly cake pan.	1.20
Jelly mold.	2.90
Waffle mold.	6.65
Strainer.	1.20
Dish drainer.	4.00

UTENSILS IN ENAMEL

		2nd Grade
Double boiler	$2.20	$2.20
Colander.	1.30	1.05
Funnel.	.50	.40
Ladle.	.45	.35
Pie plates.	.55	.40
Measure	1.00	.80
Uncovered sauce	.55	.50
pans.	.75	.60
	1.35	1.00
Basting spoons.	.30	.28
Tea kettle	3.00	2.55
Mixing bowls	.95	
	1.20	
Tea pot.	1.75	1.60
Dipper.	.85	
Oval dish pan.	2.40	1.85
Soap dish.	.55	.45
Sink drainer.	.75	

UTENSILS IN GLASS

Three kitchen glasses	$ .10
Baking dish (oval).	.55
Baking dish (deep).	1.50
Lemon squeezer with holes.	.25
Measuring glass.	.15
Spice jars	
Casseroles (according to taste as to size and depth)	
range in price form 2½ qts. at	3.00
to ½qt. at	1.25
Individuals at.	.75
Pie dishes, shallow.	.90

Bread pans	$1.75
Layer cake dish, 9⅛"	.90
Custard cups, 4 oz.	.25
Fruit jars, 1 qt.	1.20
Fruit jars, 1 pt.	1.05
Glass butter crock, 1 qt.	.45
Glass butter crock, 2 qts.	.70
Glass butter crock, 4 qts.	1.00

EARTHENWARE

Tea pot (medium size)	$1.50
Butter crock.	.50
Small mixing bowls (two).	.60
Large bowl.	4.50
Casseroles (individual).	.50
Custard cups, per doz.	1.70

JAPANNED WARE

Bread box	$3.00
Cake box.	4.00
Dust pan	.63
Flour bin (10 lbs.).	7.00
Boxes:	
Tea	1.25
Coffee	1.25
3 Sugar.	1.50
Trays (2).	.75
Salt box.	1.75

TIN WARE

Flour sifter	$ .56
Grater.	.30
Flour scoop.	.30
Biscuit cutter.	.25

Apple corer. ..... $ .18
Nutmeg grater. ..... .15
Pastry sheet (10″x17″) ..... .70
Steamer, fits any kettle. 4.25

IRON WARE

Garbage pail (galvanized). $1.00
Poker (coal stove). ..... .20
Lifter (coal stove). ..... .10
Ash can (coal). 5.75

WOODENWARE

Mop handle and mop ..... $ .80
Broom. 1.70
Chopping Board. ..... .75
Meat board. 1.25
Bread board. ..... .75
Rolling pin. ..... .35
Pair of butter pats. ..... .35– .50
Spoon ..... .15 up
Onion chopping board (an extra board not so called in the shops). ..... .25
Towel rack. ..... .60
Salt box. 1.25
Step chair. ..... 5.75 up
Table, all wood (3′). ..... 10.00 up
Knife board. ..... 1.00 up

CUTLERY

Scissors. $2.25
Silver nickel
3 knives at. ..... per doz. 4.00
3 forks at ..... per doz. 4.00
3 spoons at. ..... per doz. 4.00

Set of kitchen cutlery including
One 2″ paring knife
" 3″ splitting knife
" household knife and fork (fine point)
" French bladed knife for general work
" 6″ blade for tough vegetables
" spatula for pastry
" large spatula for lifting cakes, candy, etc.
Two carving knives
8″ blade, stiff
9″ flexible slicer. $5.00
Measuring spoons. ..... .38

HARDWARE

Ice pick. ..... $ .20 up
Meat skewers (set). ..... .35
Metal mesh pot cleaner. ..... .20
Nut cracker. ..... .75 up
Can opener. ..... .10 up
Cork screw. ..... .45

BRUSHES

Bottle ..... $ .15
Dust 2.63
Pastry. ..... .70
Refrigerator. ..... .25
Scrubbing. ..... .65
Silver. 3.63
Sink. ..... .15
Vegetable. ..... .12
Stove. 2.75

WIREWARE

Egg beater ..... $ .25

Broiler (coal, oil, wood stove). $2.50
Deep fat basket. 1.60
Potato masher. ..... .25
Purée sieve. ..... .85 up

FABRICS AND PAPER

Cheese cloth, per yd. ..... $ .38
6 dish towels at. ..... .90
6 dusters at. ..... .50
3 floor cloths at. ..... .40
2 oven cloths at. ..... .15 – .25
Roller towels. 1.25
Roller towel rack. 1.38
6 glass towels at. 1.25

MACHINERY

(When possible electric. Prices here not for electric devices)

Bread mixer ..... $ 4.50
Cake mixer. 4.50
Meat, nut grinder. 4.50
Egg beater. ..... .40
Electric fireless, 2 units. .....
Electric mixing units—Price on inquiry at electric appliance stores.
Motors—Price on inquiry at electric appliance stores.

GENERAL

Pail (12 qts.) $2.38
Scales (with scoop). 7.75
Scrap basket (metal). 2.75
Large needles. ..... .35
Labels (per box). ..... .15
Cork (per box). ..... .15

Clock	$2.50 up to 9.00
Paper—	
Shelves (roll)	.85
Drawer (roll)	.85
Wax (roll)	.50
Napkins (per 1,000)	$3.00 up

A SET OF UTENSILS IN ALUMINUM SUITABLE FOR FAMILY OF FIVE

Tea kettle	$6.50
Double boiler	4.05
Straight sauce pan	4.05
Straight sauce pan	2.35
Sauce pan and cover	1.40
Preserving kettle and cover	2.35
Strainer	1.20
Steamer section	1.80
Coffee pot	4.15
Fry pan	3.60
Pudding pan	.80
Pudding pan	1.30
Bread pan	1.15
Tubed cake pan	1.85
2 jelly cake pans (each)	1.20
Corn cake pan	1.65
Roaster	7.20
2 pie pans (each)	.62
Measuring cup	.60
Mountain cake pan	.85
3 boxes "Wear-Ever" cleanser	1.05

Here follows what a first-class aluminum manufactory believes to be a complete set of aluminum for the home. This shows another's ideal of essentials.

Tea kettle	$7.05
Double boiler	4.05
Sauce pan and cover	1.40
Straight sauce pan	2.00
Straight sauce pan	2.35
Sauce pan and cover	1.88
Preserving kettle, cover	3.62
Strainer	1.20
Steamer section	1.80
Coffee pot	4.15
Tea pot	5.85
Fry pan	3.60
Griddle	5.55
Waffle mold	3.65
Pudding pan	.80
Pudding pan	1.30
Bread pan	1.15
Tubed cake pan	1.85
Mountain cake pan	.85
2 jelly cake pans (each)	1.20
Corn cake pan	1.65
Gem pan	1.60
Roaster	7.20
2 pie pans (each)	.62
Measuring cup	.60
Tray	1.65
Water pitcher	6.00
Jelly mold	2.90

See chapter XL for suggestions as to weights and measures.

China

China for the kitchen can be had at varying prices depending largely on the part of the country where you

live—from ten cents upward if there is a dime shop around. Yet there are inexpensive sets to be had from time to time at from $20 upward—and downward.

It isn't always necessary to buy at the beginning a whole set of china for the kitchen. Six of each thing ought to be plenty for a time, counting breakage, which is perennial.

Platters for the ice box in enamel are excellent, but if you have extra plates for kitchen use they might (subject to easier breakage) be utilized.

The Cook Book

Last but not by any means least is the cook book. For what availeth it if you have utensils by the score if you know not how to fill them and manage foods in them?

There are many books on the market of fame and repute, but we have yet to see one for the beginner that outdoes the *Home Science Cook Book*, by Anna Barrows and Mary B. Lincoln. Both these women have cooked and lectured and taught the science of cookery, and, what is more, they know its practise. In this book are to be found simple, brief, successful, economical recipes and methods of serving which in their very simplicity knock terror out of the culinary life for the matrimonial initate. The writer of this article has had eulogies heaped upon her by various brides and even experienced housekeepers for the knowledge given them of this book.

CHAPTER XX

CANNING AND PRESERVING

TO get the best results in canning and preserving fruits and vegetables (disregarding, of course, the necessity of good recipes, for this is not a cooking history in any sense of the word) you must use the best set of utensils.

It has now been proven that the process of packing fruits and vegetables into containers, and sterilizing them after packing, is a better method than the old way of cooking in an open kettle, transferring hot to the jar, and sealing without further sterilization. Therefore, you must know what utensils to use for the process (that is, the final application of heat to the sterilized product) as well as for the packing.

There are canners made for the express purpose of doing this work and they must be chosen for the amount of work necessary to be done. The small, hot-water canner is the least expensive for home use and is good for fruits and tomatoes. These two are canned in this safely at the boiling point, and are often better than products processed at higher temperature in other canners. If you have not got a water-seal canner or a cast-iron, steam-pressure canner, or a small, portable hot-water canner (water bath canner), you can use a wash boiler or bucket or an aluminum or enamel combination roaster-canner, or an enamel or aluminum boiler, if you place the bottles of fruit during the processing on a false bottom and put on a tight cover.

The false bottom, of course, is best made of strips of wood and keeps the glass jars from contact with the metal container, which is dangerously near the flame. This, of course, is to prevent breakage. You can use wire netting and galvanized trays, which must be raised 1″ to 2″ above the vessel floor to permit circulation of water underneath the jars.

A very simple steam-canner is on the market now, made of copper covered with nickel.

The Processes of Canning

The processes of canning are well known—the cleansing of fruits and containers, the scalding or blanching, cold dipping, packing, processing, air releasing and sealing. For these processes the following articles are used: Colander; steamer for blanching; preserving kettle when preserving; ladle, measuring cup; funnel; canner or aluminum or enamel roaster-canner; strainer; dipper; silver knife; shallow trays; pans; vegetable brushes for cleaning; sieve; squares of cheese cloth also for blanching; wire basket; teaspoon; spatula (a most convenient pliable blade to use like a paddle to let air out of the jars before sealing); scales; and saccharometer if accurate work is necessary in preserving. Wooden spoons and saucepans are necessary if the product to be packed is to be cooked. Also the indispensable handle with which to lift the jar from the hot processing utensil.

In using the aluminum roaster and canner with rack, fill half the lower pan with hot water. Place the rack in position, and set the jars on the rack. Place the caps on the jars lightly—do not screw them down tight. Place the cover on the canner, being sure that the ventilator is closed tight in order to confine all the steam.

Only one burner is necessary in case a gas, gasoline or

oil stove is used. After the water begins to boil, the flame may be turned down one-third to one-half—just keep the water boiling nicely for the proper length of time as per schedule.

When the time necessary for sterilization has elapsed, remove the cover from the canner, and the jars can be taken out without difficulty.

Then come the mechanical parers, hullers for strawberries, stones for cherries, corers and slicers, all valuable when the products to be preserved or canned are in sufficient quantity to warrant their purchase. Of course, a good steel knife must always be in the kitchen, and a thermometer makes work less haphazard, for the kitchen without a thermometer is like a motor car without a speedometer.

Preserving and Canning Jars

Probably of all the pernickety parts of preserving and canning operations, the jar question is the most jarring (pardon the pun, but it truly must have had its genesis here, and one can't refrain from putting a joke back on its native heath!).

We will entirely disregard the tin container because it is rarely, if ever, used in the home. In the use of glass jars the same attributes of construction, efficiency, utility and economy must be considered. There are numerous brands and variations of these brands on the market. Sometimes, in a canning or preserving operation, strange to say, the contents of five jars will turn out well, and the sixth will be a failure. This is, of course, due to the human or inhuman equation. Here are some of the types:

1. Glass jars with metal screw tops lined with porcelain, made more air-tight by a rubber ring. These tops can be used again and again.

2. Glass jars with glass tops fastened by a wire clamp, plus the rubber ring. The tops are usable again and again.

3. Glass jars with flat metal tops held on temporarily by a metal clamp until firmly sealed and then taken off. These look neat and ship-shape, but the top must be punctured before its removal and therefore new caps must be bought each time.

4. Glass jars with flat metal cap over the rubber ring and a bracelet ring with thread and overlapping top edge which, when screwed over, holds the top securely. These tops can be used indefinitely.

5. Glass jar with hermetic seal with lacquered metal top; around the inner edge of the top is a narrow lining of a composition which, when heated, softens and sticks to glass, and while the adhering is going on a wire clamp holds it together and is removed after it is sealed. It is self-sealing but you are unable to remove cover if for any reason during the processing it has to be removed.

The government has this to say about the types mentioned above:

"If the old-fashioned screw-top jar is used (No. 1), good caps are essential for safety. After having been used the edge of this cap becomes flared and the porcelain lining frequently is loosened from the top. This lid then not only is difficult to sterilize but may fail to give an air-tight seal. If such jars are on hand and must be used, it will be better to use them for the canning of fruits, preserves, and other products which are easily processed and to secure jars of the lightning-seal type for vegetables which are more difficult to preserve."

In preserving it is always well to put a three-ply

hot towel underneath the jar when pouring hot material into the jar to insure against breakage—*especially* when the table has a glass or porcelain-like top.

Sealing Tests

If, after twenty-four hours, the seal or hermetic jars can be lifted by their lids without falling from grace or from anything else, the seal is pretty sure to keep the contents in good shape.

Screw-top jars can be tested by inverting in order to discover leakage. All jars should be tested and reprocessed if jars leak.

Sad to say, foods in the best seal containers are often ravaged by the culinary Bolsheviki which are bacteria forming in the most airless jars. Unless all the bacteria are killed in processing, the tight seal is no indication of salvation.

To make safety surer, the laws of cleanliness must be observed to a scrupulous degree. The table scoured and covered with oil cloth, to prevent dirt; refuse cans near at hand to prevent any accumulations of bacteria or decay; containers and tops boiled at least fifteen minutes before using, and used as soon after as is possible, and then inverted either in water or on an exquisitely clean surface until used. Rubber rings for sealing jars must be cleaned immediately before using by dropping, for one minute, into a boiling solution of soda and water (one quart of water to one teaspoonful of soda) and removing quickly from fire to prevent rubber deterioration. Buy only the very best rubber rings on the market or else your crop may fail. New rings must be bought for every canning and preserving process.

Preserving is the result when whole fruits are cooked in syrup until the syrup is clear and transparent. The

object is to have the fruit thoroughly permeated with the syrup. Preserving then is the process of introducing syrup into the fruit.

A United States Government authority says: "In order to prevent shrinkage it is necessary to put fruit at first into this syrup and increase its density slowly enough for diffusion to take place and for the fruit to be permeated with the syrup. This is done by boiling the fruit in syrup or by alternately cooking and allowing the product to stand immersed in the syrup, the density of the syrup being increased by evaporation or by substituting a heavier syrup for the lighter one after each period of standing. If at any time the fruit shrivels or wrinkles the syrup should be made less dense by the addition of water. If this process be carried on gradually enough the fruit may be completely saturated with sugar (as is the case with crystallized products) without shrinking."

Density Measures

When there is much preserving to do, and absolute accuracy is a saver of money and time, a measure is used for determining the density of the liquids. This is called a saccharometer. It is inexpensive, about the same price as a thermometer, and consists of a long glass spindle like a thermometer with a scale on it, but, instead of mercury, the bulb is full of shot. When put in a vessel of water it rests at the bottom of the vessel and registers zero. As the density increases the spindle rises until the solution is saturated with sugar at the temperature indicated, the reading being one hundred. This, however, is the Balling scale. The Brix scale is more accurate and is more expensive. When using a saccharometer use a 250 cubic centimeter glass cylinder, or a brass saccharometer cup for the liquid.

The preserving kettle and the rest of the list of tools can be used for preserving. For cooling, enamel or aluminum trays are the best. Fruits will discolor tin. When jars are full, as mentioned before, slip a paddle, silver knife (silver doesn't discolor fruit) or spatula through the fruit next to the container when packed to remove air bubbles.

Aluminum Utensils

Aluminum is light and enduring and contrary to allegations, cooking acids in aluminum utensils does no harm whatever. In fact, if any chemical action should take place, it does in the aluminum, and not in the food. Chemists use it to cook acids in sometimes which is a proof of the hardness of it in cooking fruit acids.

If compounds were formed with aluminum, they are entirely harmless and have no more effect than any of the organic salts. Salts solutions can be cooked in aluminum, but don't store a concentrated brine as pickling mixtures in aluminum, or the aluminum may become pitted.

To clean aluminum never use a strong alkali. Steel wool is the best cleanser on the market at present. If when a utensil is washed any slight stains or discoloration on the inside are immediately removed with some steel wool and a mild soap, it will be kept in a bright and shiny condition all the time.

Oxalic acid is often recommended as one means of removing the discoloration from aluminum, as it unites so readily with the iron or mineral deposit which sometimes forms on the aluminum from the action of hard water. This, however, we do not generally recommend as it is not a safe plan to have it around.

Enamel Ware

Enamel ware has a steel basis coated with porcelain. Probably no cooking utensil has so long and classic an inheritance, for enamel on metal, as jewelery, comes to us from the ancients, but it is not until modern times that this process has been used for cookery.

The porcelain or enamel is so spread, hardened and annealed or tempered that it is about as elastic as the steel and therefore does not break or crack under high temperatures. But the cheaper qualities are not reliable; consequently buy the best. There is no chance of appendicitis in using enamel ware for never has any intestinal disturbance been found to have originated from chipping enamel (as has been said by enamel's enemies).

So have no fear about using good quality enamel or aluminum or any other of the best quality utensils sold to you by reputable manufacturers. You are not only safe but fortunate when you can afford the best variety of the best species.

The enamel merchants say that their ware is decorative and therefore lends charm to the kitchen because it can be bought in blue, green, white, gray, maroon, etc., and we add, too, that aluminum is decorative and it adds a silver-like touch to a well put-together kitchen.

Enamel is cleaned like a china plate, with plain water and good soap; whereas burn adheres more tightly to an enamel dish than an aluminum dish, it is easily removed and the upkeep simple and swift, adding much comfort to the housewife.

In the purchase of any utensil, see that it is smooth, seamless, crackless, air-bubbleless, and light in weight.

Electric Canning and Preserving

When it comes to canning and preserving, the electrically equipped kitchen is splendidly prepared to handle this matter with the greatest ease and facility. Where there is a large electric range, it is unnecessary to have any additional canning machinery, for the sterilizing of the jars can be done right in the oven of the range. The jars may or may not be immersed in a water-bath, just as it suits the cook, without the bath is certainly easier and quicker, for the jars, when cold-packed in the usual way, are merely set on a rack in the oven. In this case, however, care must be observed not to keep them there the full length of time prescribed in the water-bath method, lest the rubber rings be scorched and afterwards develop defects.

Failing a large electric range, the next best thing is the electric fireless cooker. Into this, a few jars may be placed at a time, kept at "high heat" long enough for the contents to reach the boiling point, when the automatic time-clock attachment will then throw the cooker on the "low" for the sterilization period. This method of canning is particularly desirable for suburban households where the kitchen garden is only of medium size; in that case the "crops" usually are produced in just about the quantity to make this the normal way of canning. With both of these electrical methods, it will be noticed that there is no huge, cumbersome and heavy boiler to be handled, a great labor-saving feature.

In the electric kitchen, jams and marmalades are made in open kettles on top of the stove, or for that matter, can be cooked on the much smaller table appliances. The even, dependable temperature furnished by electric heat is appreciated in these long, slow-cooking proc-

esses, where with other methods, there is danger of burning unless ceaseless watch is maintained.

In some of the new stoves, you can set the containers right in the oven (see Gas Ranges Chapter VII also Electric Ranges Chapter VI and Oil Stoves Chapter VIII). This is a great saving of effort to the woman without a maid, as in this way the canning and preserving processes can be much simplified, if attention is given to cutting out extra utensils and processes.

For a household where marmalade, jelly and fruit-juice making is carried on on a large scale, an electric fruit-juice extractor adds greatly to the rapidity with which the work can be done.

CHAPTER XXI

CASSEROLES OR THE REVOLUTION CULINARY

"SINCE my daughter came back from driving an ambulance in France and from living in the various towns, she has not only brought back an international atmosphere with her but she is quite a Kitchen Red. She has revolutionized our whole culinary system."

"You strike terror to my soul. What can you mean?" I said with amusement.

"Well, since she has returned she is keen for cutting down unnecessary effort and unnecessary processes and she thinks that the French have solved the simplifying of cookery by the use of the casserole or casserole system as I like to call it!"

It is quite true that these fads are overdone, generally. But this is no fad, as it's been popular for æons, and if it had not been, why should you not give it a trial? Because a thing can be used intemperately is no reason why it should not be attempted. We drink water, yet we don't choke or drown ourselves very often.

In these servant famine days where people either have none, one or a very depleted staff of them, processes must be cut down, handling of utensils must be decreased. Therefore, cooking in dishes that can be used on the table, and coming directly from the stove, cuts the use of one set of dishes, of washing the extra dishes, and as these utensils are of pottery or glass the ease with which they can be washed cuts this process in half.

These casserole dishes are made in glazed pottery, white on the inside and you can buy them in pretty nearly every color, as far as the outside is concerned. Because of the heat-conducting attributes of pottery long and slow cooking is the result of their usage. This fact is, of course, their greatest asset, because slow cooking is necessary to bring out the best flavors and render food more digestible.

Casserole cookery—after all with the French it means really a kind of dish. Adapted to our use as mentioned before, it is a system by which cooking is done (slowly in the casserole) in utensils usable on the table. Strictly speaking, casserole cookery is cooking done in the casserole. The French use the casserole for made-over dishes and have given the world a fund of dishes and ideas which have saved much money and besides given much pleasure. This, of course, is a culinary as well as an economic feat. And probably one of the best uses of the casserole is the fact that tough cuts of meat and cheaper grades of vegetables which are just as nutritious as the expensive are rendered delicious and appetizing by this slow casserole cooking.

The appearance of these dishes is enough to stimulate the jaded palate. They come, too, with cases made in the different metals: copper, brass, iron and silver. The dish as it is taken from the stove is slipped into one of these open-work cases and gives quite a finish to the table. These holders, be it remembered, are not necessary, but for that reason they are alluring.

But, people are prone to think that casserole cookery means living on stews and cheap cuts all the time. But this is entirely wrong, as you can bake, roast, boil and braise in these dishes. Excellent cake and bread, soup and fruits can be cooked and all very deliciously.

Scalloped dishes and marmites and things in ramekins are very good, too. These are casserole cookery, too, only those dishes are for the most part "individuals," and these individual dishes are often made in the more delicate pottery wares. Naturally, you do not have to use the family size always.

They are so made that they do not break if you use ordinary common sense with them. When they are new, they should be set in very cold water for a few hours, let the cook apply gradual heat, never sudden heat, and remember that she must not put them on or in the stove without something in them, and that when she uses them on top of the stove she must put asbestos or metal trays under them to insulate them from too direct a heat.

Common or uncommon sense has to be used with all cooking utensils to lengthen their lives. But here are some of the good points in casserole cookery:—Less liquid need be added when using them as the food in long cooking cooks its own juices; left-over foods become delicious in them; freshly cooked foods become most appetizing; the tight covers keep in all aroma and flavor (if the cover doesn't fit tight enough a little flour paste around the top of the casserole will seal it completely); there is no burn to remove when washing these dishes and food cannot adhere obstinately to cause a loss of time and patience; anything that is to be removed is very evident and rubbing it off the smooth sides is very rapidly accomplished. And they look so well after they are cleaned that the cook is well repaid.

In buying casserole dishes, you should be sure that they are smooth on the inside and outside with no little blisters or cracks. The best casseroles are not expensive and it is very encouraging to-day to get anything with epicurean attributes at proletarian prices.

Women should try things as business men try things

when they are cutting down expenses, and operations. And it doesn't matter how wealthy a firm is either when cost reduction can be made. Isn't it queer that our wealthy women never think of cutting costs in their kitchens? Yet the wealthy firm is always trying to shave costs.

After women realize that slow cookery is healthiest and is most economical, why do they persist in being too conservative to buy new things? There seems to be no reason except that they may unconsciously feel that were they to begin on slow cookery, they would adhere to it so rapidly that rapid cookery would fade away. It may be recalled that some housekeepers insist upon cooking even the demi-tasse in paper bags!

But to save the rapid cookery processes, the glass utensil has been born and is waxing popular. Rapidity is its chief attribute. By this rapidity in cooking there is a saving of fuel, and as the utensils are taken directly from the stove, as are the casseroles, and used on the tables, there is the same saving of service time. These glass utensils bring out the flavors in all kinds of foods; they do not absorb odors or greases; they are very easy to keep clean; there is never any burn to remove and one can always see inside the utensil to find out how the food is faring!

On first thought you may fear breakage. But they don't break. They are strongly guaranteed against breakage in the oven. They are annealed so perfectly that they can stand intense and sudden heat and not break. Chauffeurs from France came back with great tales of safety glass which is used on motors. This glass rarely breaks. Even if hit by shrapnel it simply cracks and crazes. This fact will give confidence in what the scientific manufacturers of glass are doing to-day.

This cooking glass is also made in engraved patterns

which make it suitable for the most exacting table use.

But why is it that cooking can be done so much more rapidly in the glass ware?

Because the glass utensil utilizes by the nature of glass composition every bit of heat in the oven and the metal utensil does not. This is proved by putting a metal and a glass pot in the oven equally full of water and the glass pot will boil very soon while the . . . you can guess the rest.

Of course, this glass is only usable in the oven. It is really miracle stuff because even boiling water poured into one of the utensils won't break it.

Can everything be cooked in this ware?

A pretty good range: light omelets, dried fruit, cake, bread, meat and rechaufférs. The glass casserole is very much in vogue at present because the glass ware is adaptable to slow cooking, too.

It's amazing, isn't it, to think what can be done with glass and china fire-proof as they have become! Yet it isn't when you think of crossing the ocean in sixteen hours.

But what is amazing is that some women are so slow to investigate and are willing to live in their unexplored mediæval culinary ruts, while in every other line they seem to be so up and coming. But women that do their own work are far more forward looking.

CHAPTER XXII

FURNISHING YOUR KITCHEN

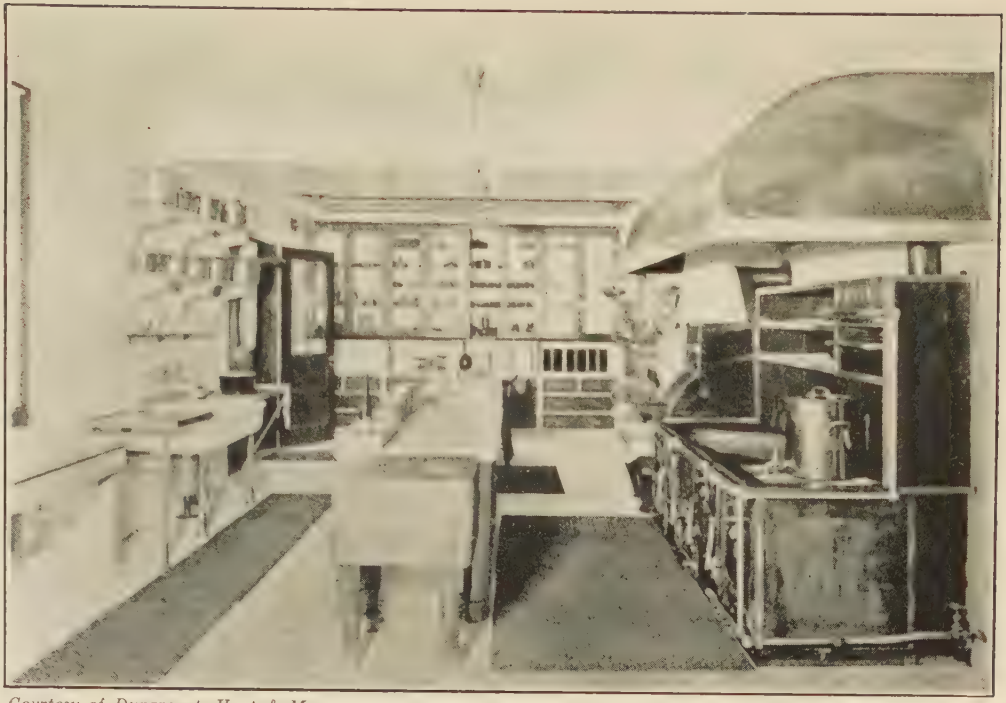
FURNISHING the kitchen sounds simple enough. But it is not. Everything put into the kitchen must have not only beauty and uniformity, but also utility, durability, tool shop convenience, and the maximum hygienic attributes. In one word, the furnishings must have absolute utensibility.

In the other rooms (save the bathroom) you can humorously tell your decorator to do it in early Pullman or seriously in Louis Quinze—and all will be well. Your furniture in these rooms must be passably durable, consistent, and beautiful, but it need not be unstainable, washable, non-absorbent, rigid, non-corrosive, etc., etc. Equipping a kitchen is like equipping a medical laboratory—skill must be employed.

The Table

Chief among the furnishings of the kitchen are the table and its relatives. They have to be rigid, enduring, and must be the correct size for the job and the correct kind for the work they are meant to do.

The table has been the storm center of discussion for years. The problem is this:—to find a table top that is non-absorbent, easily cleaned (not holding stains like an artist's palette), not brittle, not cracking under changes of temperature or when utensils are dropped upon it.



Courtesy of Duparquet, Huot & Moneuse

SHOWING THE MEAT-CHOPPING TABLE, RANGE, TABLE ARRANGEMENT, RUBBER MATS, SINK, AND POT SHELF ARRANGEMENT

For if you are doing your own work, you do not want to be scraping and cleaning all day, and if you have servitors you will want them for more productive work.

This is a big order. Teachers, scientific experts, and manufacturers of laboratory conveniences (they are never called kitchen conveniences in these circles! Would this nomenclature help the servant problem?) have massed their findings and the results of the world-wide demand for a practical kitchen table top are the following:

Enamel Tops. These (and their confrères vitrolite, etc.) are excellent if you know that the manufacturer is good. They do not crack or craze (fall into multitudinous vein-like cracks) and break with ordinary usage. The enamel is baked over steel or iron and should be at least three coats thick.

Glass Tops. Not for general utility, but well adapted for the pastry table since with this top no special pastry board is needed. Glass tops are really very beautiful and have every qualification but unbreakableness. Some new patents are less brittle than old makes.

Marble Tops. Excellent for the pastry table, and if one can afford them, fine for most things. There is only the remotest chance that they may break and only when they are less than 2″ thick

White Metal Tops. Excellent, non-corrosive, flat coverings. They are expensive but do not need any nursing to keep them in order.

Zinc Tops. Very much used, but these tops buckle and puff and are very much affected by acids and alkalis.

Wooden Tops. Far better than zinc for the householder who cannot afford the other tops. The wood can be treated with non-staining varnish, or a varnish

that can stand heat without being annihilated, and you will have a fine table. If this is not possible, the ordinary wooden table, fresh from the shop, if covered with linoleum or oil cloth, is very useful and durable, especially since the linoleum can be changed inexpensively and often. There may be a metal binder around the wooden table top if desired.

Composition Tops. These need a guarantee as they are often of glass or some mixture undefined.

Tin Tops. These are not used any more, as far as we know.

Special Tables

The ordinary table length is from 3′ to 7′, depending upon the size of the kitchen. There are usually from one to three tables in use,—more often two. The ordinary heights are from 32″ to 28″. Get the height that fits your workers. Be sure to find this out if possible; otherwise you will have to make a later arrangement.

Maple is a satisfactory wood for strong tables; ash, and pine for the cheaper kind of top.

The marble top table is the royal pastry table, which, of course, though not a luxury, is an extra table. Fancy a seven foot marble slab 2½″ thick! Isn't it like an Alma Tadema conception! The pastry table usually has a rack of some sort beneath it, either slatted or solid. This rack may be half shelf and half electric plate warmer. In smaller homes the pastry table of 3′ length is the most convenient with a somewhat thinner marble top or glass top.

The top of the cook's table is sometimes divided into two parts, one part made of marble or glass for pastry work and the other part of polished wood for ordinary pursuits. This effects the saving of a table if the cooks do not squabble or there is but one cook and little room!

The cook's table is placed opposite the range and has a 7′ pot rack attached.

The legs of most of these high-grade tables are tipped with metal to keep them unspotted from the washings of the floor. The trimmings, too, are of the same metal, formerly called German silver.

It would not be a bad idea to have a metallic tip of some sort put on the legs of the less expensive tables, to keep them from wearing and to maintain a rigidity well beloved in tables. For there is no happiness in table tipping outside of the spiritual seance!

Kitchen Cabinets

A kitchen cabinet (see also Chapter XXVII, Kitchen Cabinets) is a thing of duty and joy forever. It is the first cousin to the table and really is but the table extended and expanded into drawers and shelves and closets. It signifies the demand of the modern housewife for a shipshape tool chest with all the materials ready to her hand so that there may be no reaching, stretching, or relay races around the kitchen in the preparation of the recurring daily meals.

For the most part these cabinets are moveable. That is, they are not built into the walls of the room. At present, however, architects are planning for them as stationary and essential parts of the kitchen equipment.

Materials

Steel and wood are the materials out of which the cabinet is made. The steel ones are better in many ways than the wooden types because they are easier to clean and are more protected against vermin. However, the wooden cabinets which are built with rounded corners are a close second to the steel cabinet, since these

corners cannot become a receptacle for food waste and are practically vermin proof. Wooden cabinets are finished in a hard enamel paint and can be washed with impunity.

Some kitchen cabinets are equipped with a rolling door which folds upwards; others have swinging doors. The swinging door, although it extends into the room a few inches, has the convenience of being able to hold extra little racks for extra little things, such as small bottles, market lists, and the like.

Never fill your cabinet too full of things, as they are prone to fall down and jangle the nerves of the worker, thus really defeating the purpose for which the cabinet is built, which is maximum convenience.

Besides the table top, which is used as a molding board, there are places for the flour bin, sugar container, bread, cake, pots, pans, rolling pin, cutlery, jars, dishes, marketing slips, and even the favorite cook book.

The kitchen cabinet is a boon to the small housekeeper and is becoming so appreciated for its concentration of work and saving of steps that even the owners of large homes insist on installing it. That is why architects are including the kitchen cabinet in their plans. It means a saving of 75% of toil and thus becomes a factor in making servants willing to stay with you.

Where there are no servants employed you, Mrs. Wife, get the benefit!

There are many smaller cabinets on the market. The sink closet, which contains all the sink soap, swabs and brushes, a real convenience indeed, as is the long and narrow broom closet, for brooms and cleaning materials. Until you have your brooms properly garaged your nerves never will be entirely rested.

Dealers and manufacturers are ready, in fact, to make any sort of a cabinet for you if they are not in

stock. Don't be bashful, get what you need for your kitchen—but never get more than you can use.

Small neat white cabinets are made, to fit corners as well as flat spaces, and give the kitchen the efficient, clean look of the laboratory.

Shelving Units

Steel shelving and built-in kitchen cabinets are growing more and more popular. Stationary shelves, built once and for all, can be installed, or you can begin with a few units and as you require more they can be bolted on to what you have, just like sectional bookcases.

These shelves are covered with three coats of enamel baked on steel and very durable, having the same qualities as the good table:—rigidity, non-absorption, and ease in cleaning.

They are the parallel of the steel filing case in the office—and that is another sign that the kitchen is becoming as systematic as the business sanctum. Just as soon as the home approximates the efficiency and standardization of the office, just so soon will the servant problem cease to be. But we are not discussing the millennium in this chapter.

The shelves can be made with or without doors. Of course doors are a little help in the fight against dust, yet even they are not infallible enemies of this household nuisance.

Very often under the shelves the plate warmer and the refrigerator are placed. Their close proximity shows that the refrigerator is insulated against the heat and the plate warmer is insulated against the cold. This is really an object lesson in the possible self-identification of good apparatus.

This arrangement will work well both in the pantry and in the kitchen.

Wooden shelves are less expensive than the steel ones, but require careful attention, frequent cleaning, and new coverings at intervals.

Plate glass shelves are being used of late.

Plate Warmer

In speaking about the above luxurious pastry and cook's tables, we touched on the matter of plate warmers.

In small homes plate warming is accomplished by ovens, oven tops, or warming plates arranged above the ovens or stove. In larger homes, however, where guests are many and often and plates and dishes multitudinous, the electric plate warmer has come to do the work.

It may be under a table, as you have seen above or it may be a separate entity.

The doors of the plate warmer are generally of the sliding variety and are of a special make of iron, trimmed with steel or white metal. The interior of the warmer is perfectly insulated with asbestos and other materials. It does not warm the kitchen. This is proved by the possibility of its being placed next to a refrigerator without any bad results to the ice.

There is a little ruby pilot light which tells you if the electricity is on or off, thus obviating the chance of unnecessary heat getting out when you wish to find out whether the warmer is functioning or not.

The electric warmer usually stands a little higher than a table, but does not alter the size of the table when built underneath it.

Chairs and Stools

Since the kitchen is in no way a lounge, the chair in the kitchen is really only another tool to assist in the

work or possibly to permit a few moments of relaxation. Of course, it is quite obvious that in some kitchens which are a combination sitting room, living room and dining room, the chair and even the couch are real comfort factors. However, this type of room is not being considered here.

In the kind of kitchen we are furnishing the ordinary modified Windsor chair is as good a model as any we know, and can and should be finished to match the rest of the kitchen.

The stool is most convenient and should be about 24″ in height, because a worker can work efficiently while sitting on this.

The chair step-ladder is convenient in rooms in which you have had to build high shelves for sufficient storage room, lack of space being the only excuse for such unreachable shelves.

There is, too, the ladder-stool, which serves the same purpose as this chair step-ladder combination.

The little wooden step is a convenience if perchance your kitchen maid is not an Amazon and needs a few more inches added to her, or if your cook happens, too, not to be of heroic mold.

In small kitchens the settle-table is a convenience. For when a bench is needed it can be used as a bench, and presto! when a table is needed, it is quickly changed into a table—the two things taking but the space of one.

Mats

Stone, composition, tile, and even wood floors are often very trying to the feet and back of your kitchen denizen. A strip or two of linoleum or cork is a great relief as it adds to the unrelenting floor a little elasticity and resiliency which takes the strain off the feet and makes for comfort and ease. These materials are the

best, for they are washable and non-absorbent, and they add rather than detract from the beauty of the surroundings. If the strips are not usable, mats can be bought or made for the space to be filled.

Matching Up

It is quite as possible to have uniformity in your kitchen as well as in your other rooms. Even if the kitchen must be fixed up after the architect has done his worst, you can at least have the same color scheme throughout.

There are on the market to-day kitchen furnishings to suit every pocket, so there is really little excuse for a kitchen to look heterogeneous and messy. Furnishing a kitchen is a most tempting problem, especially with not too full a purse. The trouble is mostly that people who know nothing about a kitchen always furnish it, because it is considered easy. It isn't easy. Even after furnishings are bought if they are not placed well they are of as little value as if they did not exist.

In getting household apparatus the first and great demand is: Know your manufacturer. And the second is as important: Buy the best you can afford after the most careful thought, and be very sure where it is going to be placed when you get it.

CHAPTER XXIII

KITCHEN COSMETICS

LIKE women, kitchens must be made up continuously to be kept up. Like women, the fairer and even blonder they are the more attractive they seem to be; but unlike women, they must never be applied with powder (as a beautifier) or with oils, varnishes and paints which for any reason disintegrate into powder.

Every Domiologist (the author's coinage for home scientist) likes a light, clean, glistening kitchen. Oils, paints and varnishes and their relatives, enamels, shellacs and lacquers, do the trick.

This article is not going to teach you to be a painter, but ought to give you the salient facts of kitchen "make up," which every Domiologist should have in her mental, if not actual, filing case.

Furthermore, in the maidless or maided house the basic supply of to-be-cleaned-things must be as nearly self-supporting as possible. Hence a smoothly varnished wood-work and un-peeling painted wall or ceiling will go a long way to simplifying the care of the kitchen, yea the whole house.

Briefly, paint, according to Wood, is any liquid or semi-liquid substance applied to any metallic, wooden or other surface, to protect it from corrosion or decay or to give color or gloss or all of these qualities to it. Note the stress on the protective quality.

According to Heckel: Paint is a mixture of opaque or semi-opaque substances (pigments) with liquids,

capable of application to surface by means of a brush or a painting machine, or by dipping and forming an adherent coating thereon.

House paints are made of pigments, drying oils (volatile or thinners), driers or "Japans" and varnishes. Pigments are divided into white bases (like oxide of zinc, the most important), inert reinforcing pigments, natural earth colors, chemical colors, pigment lakes, etc.

Varnish enhances the beauty of surface, protects them from injury, increases the luster or hardness of other coatings, excludes moisture and gases, vapors and other atmospheric agencies of decomposition or decay.

Preventives of Disease

Paint and varnishes in the main have been thought to be beautifiers only, but in reality they are much more than this, for they are very complete means for the maintenance of sanitary conditions in the kitchen and are made for application on metals, cement, concrete, plaster, wood, etc. Therefore, there is nothing in the kitchen that cannot be re-surfaced if necessary.

Cracks and holes spell vermin and germ traps, which make efficient distribution centers for disease. Here is where paints and varnishes and the adjuncts not only fill the cracks, but fill the bill before the physician has time to send his.

The best blanket dictum to remember is that: Cleanliness is next to hole-iness. Fill up the holes, cracks, splits, roughnesses and unevennesses. Render all surfaces non-porous by application of liquid paint fillers. But before all else, scrape and pumice and wash surfaces with good old soap and water. Benzine is very often not sufficiently efficient in preparing for paint applications. Evenness, cleanliness, non-porous-

ness, these three, and, to be Irish, the greatest of these is elbow grease—the best of all kitchen cosmetics applied in preparation and in brushwork.

Choose the Manufacturer First

"What criterion have we," asks the Domiologist, "in the choice of paints?"

The answer is, "Choose the manufacturer, then choose the paint."

No household has a laboratory, and the widest advertised paint brands have stood the test. Consequently, a can opener, the paint, and an all-seeing eye to keep abreast of the advertisements are the requirements for the pocket laboratory. But, the standard for any paint is the overworked word "service." If the paint you and your friends have used does not wear, get another make. But by all means, do not use these things blindly any more than you would use face powder without knowing the brand. Buy the best. In no other household commodity is this advice more important.

Sometimes the best paints and varnishes deteriorate in storage or transit, by being kept in too cold a room, and may be explosive if treated with too high a temperature.

Paint Rules

In buying paint it will do no harm to bear in mind:

1. That one gallon of paint should be distributable over an area (in two coats) of 300 square feet.

2. A good paint should produce a surface that is neither too hard nor too soft. Surfaces that are too hard are prone to chipping and cracking or splitting. Sometimes they remain sticky if they are too soft, or chalk or powder or flow.

3. The average life of a good application of good paint is four years. It ought to last fifteen years, but to-day in our apartments we are glad if it lasts one month. Three years is the minimum, but a simple pigment paint frequently plays out in three years.

4. That paint must be durable in color and should last at least four years under normal conditions. Good floor paints and varnishes can stand dragging furniture, walking, hot utensils, steam, water, even alcohol and greases.

5. That good paints should leave surfaces suitable for repainting, which, being interpreted, means that the old paint should be still unbroken, making paste or liquid fillers practically unnecessary.

Paste fillers with or without color are used to fill deep cracks, etc., not, however, caused by broken paint surfaces, but by faulty construction, warping, blows in plaster, wear, and such injuries.

The common ills which are met with in paint life are:

1. Peeling, cracking or powdering, due to imperfect attachment, probably on greasy, damp or over artificially heated surfaces from which the moisture is driven up through the paint.

2. Blistering, due to underlying vaporized moisture. An excess of volatile oil prevents this. It often occurs on incompletely dried lumber, and often light or some chemical agency is the cause.

3. Alligatoring, incipient cracks due to heavy coats of paint applied to unseasoned wood especially if the paint is drier, tougher or more elastic than the under coats.

4. Wear. This is the only legitimate ill, if it takes place after the allotted period of its life.

The common epidemics in varnish life are bloom

(opalescence), blistering, spotting, cracking, sweating, powdering, livering, crawling (refusal to spread), flasking, deadening (loss of luster), pitting, silking (looks like enameled silk), seedy or specky, wrinkling, grain showing, crumbling, all due to imperfect preparation of surfaces and the presence of moisture, greases, poor varnishes, poor application of good varnishes, different brands of varnishes put together, increase or decrease of temperature in drying or storage or transportation, etc.

There are hundreds of kinds of varnishes divided into: oil varnishes, spirit varnishes, japans, enamels and specialties.

In house finishing, oil varnishes, enamels, painter's Japans and sometimes spirit varnishes (shellac and dammar varnishes).

Lacquers are highly transparent varnishes used on metals to produce a lustrous film.

Japans (decorative) are dark varnishes applied to metals and wood.

Japans (painter's), are varnishes added to paints for luster and drying.

Employ an Expert

So it can readily be seen that the painting and varnishing of the kitchen should be, if nothing else, given over to experts. The painter should understand these requirements. "The priming coat," says Heckel, "being the one on which the adhesion of the entire paint film depends, should be most carefully considered. It should be sufficiently liquid to penetrate every pore and irregularity of the surface, carrying with it particles of the pigment; but this fluidity must not be obtained at the cost of the future strength of the dried film. For the priming coat it is customary to add a quantity of

oil and some turpentine or benzine or, in the case of cypress, yellow pine and resinous woods in general, some form of benzol. It is easy to overdo both. Only enough of the volatile thinner should be used to avoid a high gloss, to which subsequent coats will not readily adhere. Hard, unabsorbent woods require a thicker priming coat than spongy woods, such as poplar, soft pine, etc. Resinous woods, like yellow pine, again require special treatment—a preliminary varnishing of knots and resinous spots with shellac, and subsequent priming with a fluid priming coat containing a benzol product.

"The second coat, which in many instances is also (improperly) the finishing coat, should be tempered accordingly. If there are to be three coats (as there should be), the paint should be lightly reduced with turpentine or benzine, so as to promote amalgamation with the priming coat, and to reduce the surface gloss. If it is to be the finishing coat, prepared paint of the average consistency can be used without reduction, but a very little turpentine is sometimes desirable to assist penetration and adhesion.

"The third or finishing coat should usually be employed as it comes from the can. In the case of all coats, thorough, hard brushing is essential, and a round brush is always preferable to a flat brush. The failure of paint is frequently due to insufficient 'elbow grease' with the brush.

"Every coat of paint should be completely dry throughout before the next coat is applied; but it is a mistake to allow a priming coat to 'weather' and become weakened before painting is continued.

"Too much drier or Japan, or cheap rosin Japans, are at the bottom of many paint failures. The manufacturer of a scientifically prepared paint will intro-

duce the proper kind and quantity of driers into his formula, and none should be added in use."

A fit condition of surface is obtained by:

(1) By delaying the application of the priming coat until the wood is thoroughly seasoned, unless seasoning has been properly attended to in the lumber; secondly, by seeing that the plaster on the inside of the building is completely dry before painting is begun on the outside. A new house should have been heated some weeks before it is painted. In an old house, leaking spouts, etc., should be repaired and the adjacent wood allowed to dry thoroughly before repainting. Thirdly, by avoiding the application of paint in moist weather or when the atmospheric moisture is high. Fourthly, by selecting a dry, mild season, as late spring or early fall, rather than a cold or hot season, as winter or mid-summer, for the work. Fifthly, by seeing that sappy or resinous spots in new lumber are properly treated before painting. Sixthly, by due care on old work that all loose paint and dust are removed by scraping, sand-papering, wire-brushing, dusting or, if necessary, burning, before new paint is applied.

As a rule, it should always be remembered that two thin coats thoroughly brushed out are better in most cases than one thick coat, and that repainting should never be delayed until the under coats begin to loosen seriously.

Only when conditions are favorable should the householder be his own painter. In any case he should study carefully the directions on the can, and unless they are found to apply to his particular job, should consult either the manufacturer or a practical painter for fuller advice.

Ceilings and walls of the kitchen are improved by the application of flat washes, calcimines, etc., of which

there are many on the market. These surfaces are easily kept clean and sanitary and for this reason have been used instead of papers in the kitchen. All discolorations and dirt, grease and dust are removable by soap and water. The best paints are not poisonous and are a great factor in home sanitation.

The kitchen floor is a more difficult problem, as the wear and tear is so much greater than suffered by the walls. However, paint and varnish manufacturers have the problem well in hand and there are paints and stains on the market and varnishes, too, which withstand wear and tear, heat, grease, steam, gases and every other normal nuisance. Of course, this holds good only if they are applied correctly. Floor varnishes should dry in forty-eight hours. Dressings for revivifying linoleums are on the market, but beware of poor ones.

Don't be afraid to investigate! This is another mandate to the Domiologist!

And bear in mind that floor varnishes and stains should be able to stand dragging furniture and foot wear, should be tough, withstand shock or abrasion, and be unaffected by normal contact with moisture. Good surfaces will give enduring service and will permit the scrubbing and washing of floors almost indefinitely. New coats can be added as the wear and tear demands. In addition to paints there are varnishes and stains combined which give effect of natural stain, and these applied to floors are more than satisfactory. These combinations, too, are useful on linoleums that have aged. These materials are made, it must be understood, to stand wear. Do not ever think of applying a wall stain or paint to the floor, as the floor compositions are made to withstand different use. Before using a stain, etc., on linoleum it is well to get advice from a linoleum firm or a topnotch paint firm.

Enamels or Pigment Varnishes

Probably nothing gives the Domiologist more delight than the effect a fine white enamel gives the objects over which it is laid. Here is a way to keep the kitchen a real blonde!

There are many of these enamels on the market which give the refreshing aspect to the kitchen. Many of them have the appearance of porcelain, and can be kept clean with little trouble. They can be bought in the glossy finish or the flat or dull or mat finish. All the woodwork of the kitchen can be treated with enamels if a charming kitchen is wanted.

The high cost of construction to-day demands the protecting powers of paints. The beauty theory of paint still holds good, but the protective power is predominant and most important.

The use of a good floor oil has been proven by Dr. Wallace Maunheimer to reduce the quantity of dust in a room from 80% to 100%. Flying dust is the aeroplane of disease. Oils, paint and varnish the anti-aircraft guns!

And, finally, read the directions on the can, get the admirable books of directions mailed gratis by the service departments of manufacturers of paint, and *buy the best.*

And do not fail to realize that the kitchen with a good complexion augurs well for the complexion of every one in the house.

CHAPTER XXIV

THE GREAT AMERICAN DISH

TO be one hundred per cent American, each one of us must eat at least two and a quarter quarts of ice-cream annually. This is the national American dish, despite Boston's claim for the baked bean and the South's for beaten biscuits.

Rich and poor, the be-butlered and the maidless make their own ice-cream. The more remote from civilization, the more each individual housekeeper makes her own ice-cream.

It is no longer a luxury; it is now recognized as a food. The Government classifies it, and it is experimented with at most of the State agricultural colleges and State experimental stations. Its making has become an industry standardized by the Government and certain rules must be adhered to by every manufacturer.

The introduction of ice-cream as an industry not only stimulated purchasers of ice-cream, but has stimulated machinery builders. To-day the making of large plants and small household freezers comprises a large industry.

For these mechanisms many problems of refrigeration, ice, brine, rock salt and packing arise. Some of these problems are important to the housekeeper as a maker of ice-cream, some as a buyer, and some not at all.

Kinds of Ice-Cream

In this sketch we will, of course, only touch upon those parts of this problem that are of interest to the

housekeeper—doing her own work or with assistance.

Ice creams are classified under various heads and sub-heads. Nearly every one interested classifies them differently. For the sake of convenience, we will give here one classification.

I. Plain uncooked ice-cream

Known as Philadelphia ice-cream, which consists of sugar, flavoring cream with or without condensed milk.

1. Plain with flavoring.
2. Fruit with flavoring.
3. Nut with flavoring.
4. Bisque with marshmallow, macaroon cake, wafers and other bread products well dried out.

II. Cooked

French ice-cream—sometimes called Neapolitan (though Neapolitan is really the many-colored layer ice cream only) made of cream, sugar, eggs and flavoring.

1. Parfaits

   Highly flavored fruits, nuts, spices (Nesserold pudding, Roman and English plum puddings).

2. Custards

   Flavoring, cornstarch, vanilla.

III. Sherberts and Ices

Water and milk, sugar, white of egg, fruit juices, etc.

1. Ices (granites frozen by oscillation and frappés—semi-frozen like mush.
2. Water Sherberts—Ices and egg, sometimes called soufflé.
3. Punches—with liquor (passing out).
4. Milk Sherbets.
5. Lacto—skimmed milk bases.

IV. Mousse

Rich cream sweetened and whipped, frozen in molds without oscillating or turning the freezer.

V. Fruit layers

Stablizers and fillers.

Stabilizers—such as gelatine, ice-cream powders and gum tragacanth, are used in commercial ice-creams to give the product body, but manufacturers should, according to law, admit this addition if necessary.

Housekeepers often use gelatine; it is quite wholesome and not dangerous in any way.

Freezing

Apart from the recipes, with which this chapter shall not deal, the most important part about ice-cream is the freezing of the mixture. Its dangers are many.

First of all, freezing incorporates air into the mixture and therefore increases its bulk.

Ice-cream can be frozen too slowly or too fast, and experience here is the best teacher.

If frozen too rapidly, says the Omaha State Experiment Station, the ice-cream doesn't expand very much (this is more important to the commercial maker of ice-cream). Without the air incorporated, it is soggy and heavy. It will also be grainy and will fall apart.

If frozen too slowly, it is buttery, greasy, non-expansive and fat will rise.

If frozen too long, it will be churned creamy, it looses expansion, it is greasy, soggy and heavy.

These are the reasons why cream is not a velvety, smooth, ungrained stand-without-hitching quality.

Here are some other defects and their causes:

First, the cream must be clean and creamy, combined with flavoring material which blends with the cream to a full delicious flavor.

There may be defects in the flavor, due to the cream used, such as sour, old, bitter or metallic cream flavor. It may be due to the filler or stabilizer, such as a starch, gum or gelatine.

Defects may also be due to other ingredients. It may be too sweet, not sweet enough, coarse flavor due to flavor material, stale fruit, rancid nuts, moldy nuts.

The cream must be firmly frozen to be smooth and velvety. If it is not, these conditions may prevail:

Icy: Due to improper packing.

Coarse: Too thin cream or packing while too soft.

Sticky: Due to fillers, such as gelatine or a sweetened condensed milk.

Buttery: Use of cream partially churned before freezing, or to cream too cold when put into freezer, or because freezer was operated at too high speed.

The Cure

First, buy a good freezer, never less than a gallon, because you can always freeze a little in it and always be ready for a crowd.

There are various types of freezers on the market. (1) those that you turn by hand, (2) by motor, (3) ones that aren't turned at all, (4) ones that are oscillated only and in which, at home, two flavors can be frozen at once. In this type it takes longer to freeze cream, but as the arm only works back and forth it is not so tiring. The can in the tub is partitioned in two segments and the paddles and dasher only turn half way.

The freezer that isn't turned at all needs no lyric from me. It tells its own story in making good ice-cream of a smooth mousse-like consistency, but real ice-cream. It is rapid and restful.

The various motorized freezers are good for large families and the small motors attachable to small freezers geared for motors are joys.

There are some kitchen units that are clumsy, some that are convenient which turn the freezer, polish the silver, sharpen the knives, in fact do everything but shine one's boots. (See Chapter XXV).

In buying these units don't be "pulled in" by salesmen talk. Watch for compactness, durability, cleanability, lack of danger in use, replaceable parts, and ease of manipulation. In the use of motors the attachment must be so made that the connections will not be catching in gearing, etc. Above four quarts, hand work is heavy and we would advise turning the freezer by a motor.

In the non-turning freezer, the chamber for the ice and salt is separated from the can so that the freezing mixture cannot enter the ice-cream.

It is cheaper to buy ice-cream, the home-made kind tastes far better. When you buy ice-cream, it is wise to watch the containers in which it comes, and to know where it is made. The Government is very particular, but slight slips in the ice-cream organizations can breed the most dangerous of bacilli. At home you can watch everything; above all, cleanliness of ingredients.

Freezing Mixture

The greatest of all the science of ice-cream making is the mixture of ice and salt. Most cook books say three parts ice to one of salt for home use. For hardening after it is frozen eight parts of ice to one of salt, and the mixture must cover the can entirely, top and sides.

Of course, the ratio of ice to salt regulates the freezing. The United States Government Bulletins are full of these ratios if you want to look up this matter.

On this subject Bowen of the United States Department of Agriculture in Bulletin 98 says:

"When two solid bodies, as salt and ice, mix to form a layer, a certain amount of heat becomes latent, called the latent heat of solution. Since this latent heat is taken from the mixture itself the temperature falls correspondingly. The temperature obtained by a salt and ice mixture depends on relative proportions of the mixture and to less extent on the salt at which the heat is supplied from the outside, the size of the ice lump and salt particles and the amount and density of the resulting brine. Hence it is impracticable to give other than approximate temperatures with fixed ratios of salt and ice."

It usually takes thirty minutes at least to freeze a gallon of ice-cream.

Freezers

Electric freezers come from about $75 up and can be had for alternate (A. C.) or direct (D. C.) current.

The advantage of the freezer with its own directly-connected motor, rather than a motor which has to be connected, is readily apparent to those who have suffered the annoyance of belting, pulleys, and countershafts. Being self-contained, such an outfit may be readily located at will; to operate merely requires securing it in place and connecting the wires. You have, therefore, no belts with attendant annoyance and expense, no countershaft with its necessity for continued attention and causing vibration, nor is there dirt and oil being thrown here and there. In addition to the mechanical advantages secured by the motor-driven ice-cream freezer unit, there are had by its use cleanliness and increased space.

Every freezer should be so made that the action of

scrapers and dasher is continuous. Some freezers have a device in which the scrapers are hung on the dasher so their lower ends rest on the bottom of the can, and the friction between ends of scrapers and can bottom when in motion moves the scrapers against the side of the can, and holds them there positively and continuously.

Tubs

The tubs should be strong and if possible bound with welded wire hoops or metal bands. If the tub is metal this is unnecessary. Tubs are made of pine, white cedar, etc. The zinc tub is a good substitute for the wooden tub, but the wooden one is good if made water tight and smooth and easy to clean. All parts of the freezer should be non-rustable, especially the can.

The best cans are made wth drawn-steel bottoms. They do not leak, do not fall out, as may happen with those having the tin plate or cast bottoms.

The best bodies of the can are made of heavy tin plate. The top of can is strongly wired and turned over, while the bottom of can is made to fit over and under the drawn steel bottom.

All gears must be completely covered so that neither ice nor salt can get in the cogs nor the fingers be caught and injured. Some freezers have gearing enclosed in a box-like fixture.

The inside parts touching the cream should be of harmless metal, generally of pure block tin. All outside parts should be smoothly finished, galvanized usually.

The ice space between the can and the tub must be so arranged as to use the least amount of ice and salt, and freeze as quickly as possible.

The cross bars which connect the handles and cover and clamp on the opposite side are often a source of agony. These must be simple in operation. Some freezers have a clamp, some a key. This is a matter of choice and manufacturer. Some cross bars are hinged and others are dove-tailed.

Freezers are supplied with fly wheel instead of cranks to turn. The fly wheel costs a little more but it is far more convenient, as it requires less turning.

Some freezers have a glass peep hole in the cover of can so one can see the progress of the freezing and obviate loss of time and cold by opening the can.

Scrapers are made of rolled steel bars ground straight and fine to fit can and to insure clean scraping of the cream, so that all parts of the mixture are being frozen continuously.

The dashers and beater are usually of malleable iron heavily coated with pure block tin. Generally (and better so) there is one scraper for the bottom of the can and two metal scrapers for side.

Buying Freezers

The same principals hold in buying freezers as any other culinary utensil. They must be seamless, smooth, easily cleaned, non-dangerous, non-corrosive, non-chipping, and be made by a reputable manufacturer.

Besides the freezer must have ease in running, quick freezing, economy, convenience, and give practical results.

Freezers are equipped with best standard motors. The motors should be so placed as to eliminate danger of motors burning out or being injured by careless handling of the ice and salt.

In ordering a motor outfit include the following—

your voltage, Direct or Alternating Current; if Alternating what Cycle and Phase. (See Chapter I).

Buy a freezer with thought. All machinery pays better when the best is bought and close attention has been given to the purchase.

CHAPTER XXV

THE KITCHEN ROTARY CLUB

ARE you a culinary rotarian? Or do you still "beat it" by hand?

The Kitchen Rotary Club is becoming a real factor in culinary economics! By means of rotary motion the mixer, the beater, the combination of these two have come to relieve the back, arm and hand and where electrically driven cause no waste of time!

Electric Rotaries

To begin with, these fairy-like machines are somewhat like and unlike patent medicine advertisements—alike because they claim to do many things and unlike because they can and do fulfill their claims!

For example, they beat eggs, mix bread dough, mayonnaise; stir cake batter, frostings, dressings; whip cream; mash potatoes; grind nuts, spices and meat; drive (some) ice-cream freezers; turn the food chopper; have grinding and buffing wheels for sharpening cutlery and polishing silver. In fact, they are companions not idly to be cast aside.

Housewives Bad Mixers

This will especially appeal to the housewife mayonnaisly—because many a good mixture has been wasted by inefficient mixings by the mixer being called away suddenly, etc. Then, too, many a mayonnaise is never

born at all because the housewife or the cook "hasn't the time to-day." Where the mixer is electrically driven, time is added unto the menage and while the mayonnaise is forming the cook is *per*forming elsewhere.

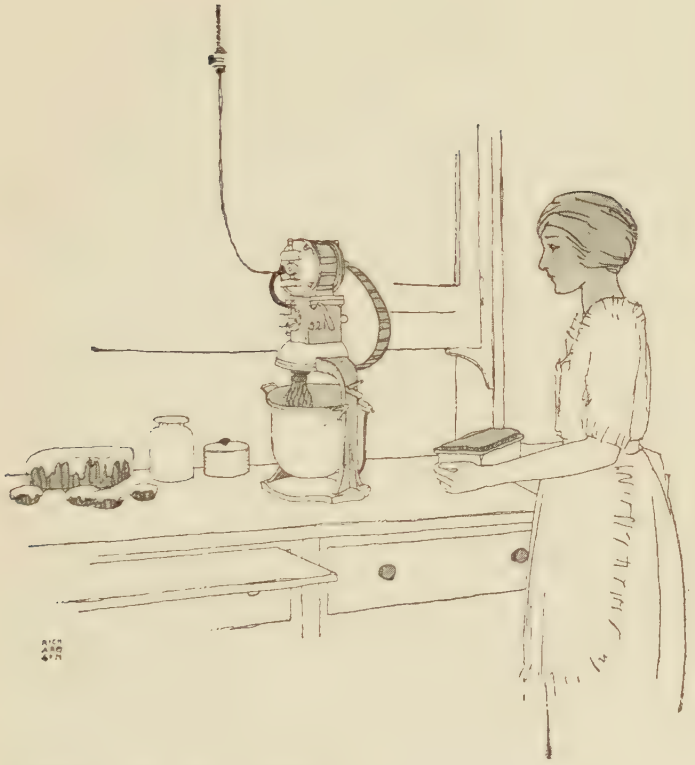
Egg beating, cream whipping, batter beating, all these take time. Now with the electric machine the home can revel in soufflés and cake. It can buy coffee in the bean and grind it with no effort—here is a real epicurean saving. For coffee in the bean and grinding it at home saves the volatile essences of the coffee which gives to perfect coffee the added aroma and full flavor. These machines grind cutlery and not "exceedingly slow" and so can add finesse to a slice of meat!

As with the mayonnaise mixing, these utilitarian investments take the guess work out of cake, meringues, batters. Improper mixing is an immorality not easily cleansed from kitchens. Yet these instruments with perfection of mechanical agitation do the mixing with assurance and become real vice chasers. Imagine! (all things being right)—you can be sure that success will come to your cakes, sauces, breads, rolls, pies, cookies, doughnuts, cheese dishes, puddings, sauces—Remember that lumpy cream sauce? Well no more of that! Your sauces and your mashed vegetables will be lumpless!

Removing doubt, removes nerve strain in a kitchen—and maybe the cook without nerve strain will be affable and a comforting dweller in your halls!

The New Machines

Among the best machines is one so made as to effectively chop food and meat, grind coffee, slice vegetables and fruit, etc., etc., has with its attachments a hot-water and ice container to be used as a "bath," if stirring must needs be done in a cold or hot medium; soup strainer and colander connection, ice-cream freezer



Courtesy of Troy Metal Products Co.

A MEMBER OF THE KITCHEN ROTARY CLUB AT WORK ON CAKE-MIXING.

attachment: a meat slicer (a great comfort and saving of meat). This motor has three speeds.

You may have never felt the need of these types of workers, but then you never knew the use of the radiogram until you used it!

Don't you hate to strain and *persuade* large quantities?

The strain is gone from straining large quantities now. This is gently done by the coaxing electric strainer and colander device.

One "mixer" is also accompanied by a cabinet if desired. It is finished in white and is made especially for this device and houses comfortably all its attachments. It has an enameled metal top and does not add much to the total cost of machine.

Another power unit advertises two speeds and has all the above attachments. It comes with a metal table with a shelf (open), on which all the work can be done with comfort.

Smaller Craft

If you don't want a machine that can do so much, there is one on the market electrically driven, which beats eggs, mixes mayonnaise, angel cake and light batter, mashes potatoes and fluffs them if mixed with butter and cream, mixes custard, soufflés, etc.

It has a small ½ H. P. motor of fine construction designed for 110 voltage. It is necessary in this case to state whether your current is direct or alternating (DC or AC). This motor can run on either direct or alternating if the speed control device is not to be used. But the speed control in this instrument is its crowning glory. That is, you can mix rapidly or slowly, a performance the older type of mixers small or large could not do. It was racing speed or nothing. All cooks

know that some things take rapid beating or stirring, some other things slower agitation. The cook or housewife can in the course of her experience with these new comers into our kitchens find new uses continually for them.

For example, this small motor has a speed regulator which ranges from 4800 to 8000 revolutions per minute. This motor takes from 25 watts (extra load) to 60 watts (heavy load).

It is well to have a detachable motor as in this one, for when cleaning is necessary the motor remains—due to its hydrophobiac (fear of water) elements—unharmed!

The beater itself here is the ancient and honorable Dover type, so you see it is not so foreign to your ken.

Time and the Mixer

1000 revolutions is all you can effect in a minute, no matter how "Red" you may be. This machine turns 2000 revolutions, outrushing the Russians and all Central Europe!

Some Evolutions

In from one to five and ten minutes can eggs, frostings, and mayonnaise be accomplished!

Full speed for heavy mixtures, half speed for lighter, a gram of cream can be had in less than five minutes.

A gallon of oil in relation to a mayonnaise dressing took but ten minutes to be used up.

Now can *you* beat it? Hasn't this phrase lost its slangy significance?

This little angel weighs but 2¾ pounds, and its lightness is one of its charms.

Requirements

All these machines should be easily attached to wall or lighting sockets or outlets. (Electric).

They must be easily cleaned.

The motor must be protected from you and food stuffs and you must be protected from it.

All attachments must attach easily. When easily is used it is meant to the limit of ease. All parts must fit, so that the doing of a new operation is not accompanied with dread. It must be a pleasure to depart from coffee grinding to turning the ice-cream pail and polishing silver.

Now, kitchening is no endurance test. The fatigue is eliminated. Your days may not be so "stirring" but at the end of them you will feel like the theatre and what not.

The hand-turned cake and bread mixers are better than mixing by hand and spoon—but if possible, the electrically driven mixers which come in many styles and prices will give you more than comfort and will outlast many a cook.

The hand-turned stoners, buffers, grinders, etc., are very efficient but not quite the joy an electrically driven unit may be in an electrically conducted ménage.

These machines are Utopian agitators! Agitating for food and helping the Kitchen Workers of the World.

CHAPTER XXVI

FLAWS OR FLOORS IN YOUR KITCHEN

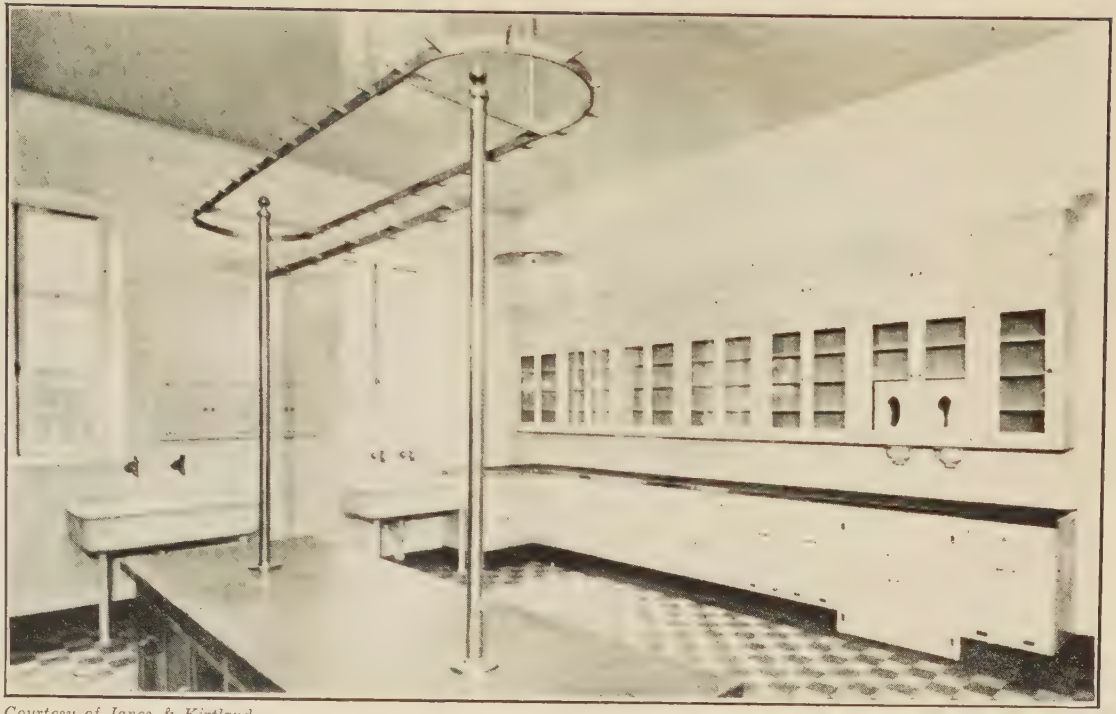
THE question of the kitchen flooring in the home is of course, a very profound and serious subject. Those who build away from cities are hard put to it to know exactly what there is on the market and those who live in cities are confused by the variety of floorings and the attractive attributes as their salesmen recite their eulogies. In order to help the prospective buyer we have set down a few basic facts.

Floor Requirements

Of course, you realize that every kitchen flooring should, as nearly as possible, be:—

Attractive,
Easy to keep clean,
Noiseless,
Odorless,
Vermin and dust proof,
Comfortable to feet and back,
Non-slippery whether dry or wet,
Durable (no upkeep but washing and polishing),
Fire proof or fire retardent,
Impervious to changes in temperature,
Laid over any kind of floor base,
Lightweight enough to be suitable to any structure,
Seamless or joined so as to be virtually seamless,
Non-warping, non-expansive of non-contracting.

Before enumerating the kinds of floors that you will



Courtesy of Janes & Kirtland

AN IDEAL KITCHEN WITH LINOTILE FLOOR (ARMSTRONG CORK CO.), BUILT-IN STEEL KITCHEN CABINET UNITS (JANES & KIRTLAND), AND COOK'S TABLE, WITH POT HANGER COMFORT

have laid before you in this chapter, it would be well to realize that a floor will sometimes keep a maid or lose her, and you will not know the "why." But the fact is that a floor can tire you if it be not a good kind for the purpose and can reduce fatigue and make for general well being if it be a good type.

Here is a list of the most important kinds of flooring in use:—

Marble,
Wood and wood block,
Linoleum, Linotile,
Cork,
Composition and concrete, (laid in paste or blocks)
Tile,
Terrazzo.

Marble can be dismissed as being too expensive, too beautiful and too resisting to the feet. It is also too cold under foot.

Wood is very popular because in the commoner varieties it is the cheapest flooring. In whatever grade a wooden floor is used, it has the disadvantage of needing attention. It always needs refinishing. The better the floor the more attention it will need. It will splinter eventually and show marks if things are dragged over it. Although the scraping down and refinishing always make the floor look like new, the wooden floor is better in any room in the house than the kitchen, laundry or pantry. There are some housekeepers who wouldn't have anything else but the hard wood floors in their kitchens—oak, maple or Georgia pine, etc.

Laying the Floor

The wooden floor must be carefully laid or else the cracks become traps for germs and dust. Of course, this applies to all flooring. And while on the subject

of laying floors, let me say that even though you order the best kind of flooring in the world, if it is laid badly, you might as well have bought the worst sort of material. It is imperative that you have the manufacturer or the manufacturer's delegated dealer lay your floor. Don't go to your village builder or carpet man. It won't pay; in fact, it will cost you dearly, as in such case the maker of these products has developed a way to lay flooring which is inseparable from the life of the flooring itself.

Many a householder knows a good floor, but few know what to look for in the laying of it.

The Linoleum Family

Among the best known floorings for kitchen use is linoleum. It is so well known and so popular that purchasers in their ignorance often accept, unwittingly, substitutes and lay felt paper instead of the real thing!

If you decide to buy linoleum, go to the best maker or his dealer. Follow their gospel *Buy the Best.* If you heed this you make an investment. If you do not, you make an expenditure.

So when you decide to buy linoleum first look on the wrong side of it, and if it has burlap on the back and if it is very difficult to tear, it is pretty definitely linoleum. It also carries the name of the maker.

It is well for the prospective buyer to know something of the manufacture of a popular article. It makes you appreciate and understand how to take care of it better.

Women should not buy unless they know exactly what they are buying.

Linoleum is made of burlap, linseed oil and cork, as the main ingredients. The oil is first boiled to thicken it. When it is cooled it is poured down over suspended

sheets or scrim and by coming in contact with the oxygen of the air, becomes oxidized and solidified. Then these oil-impregnated skins are ground up and mixed with gums to give the fabric elasticity and it is then mixed with ground cork or cork flour, the coloring matter, and the rosin, (to harden it). This mixture is fed into a machine which distributes it evenly over the burlap. It later passes through a series of finely adjusted rollers weighing about 27 tons each and adjustable to space of 1/1000 of an inch between rolls which, of course, give any required thickness to the linoleum. This is plain linoleum and it is many weeks in the making.

The printed linoleum is made by passing the plain over print drums.

The straight line or inlay is done by a still more involved process, but the patterns never wear out as they are an integral part of the linoleum, going through from back to front of the material.

Highly paid designers are engaged in this work and many craftsmen of great skill are employed for stencil work, etc.

You don't always realize the time, work, and expense of the ordinary things that you see about you.

When the linoleum is being laid, look out for these things. (They apply pretty generally to the laying of any flooring of this kind.) If over wood—the nails must be hammered in below the surface, the wood laid too to avoid dampness and cracking. If over concrete—it must have dried a month or two and be filled in with plaster of paris if it has any cracks. It should be laid over felt in both cases to insure long life to the linoleum and the comfortable resiliency to the foot and consequent ease to the back. The felt acts as a cushion, makes the linoleum fit better, and obviates later refitting and trimmings. See too, that the workmen are careful to

force the strips close together and cement closely. These things if it is absolutely impossible to get the linoleum people themselves to lay the floor. It would be wise then, to get their booklet.

It is easily kept in condition if you:

Use only mild soaps, never caustic powder, with warm water. Rinse immediately with clear water and dry immediately. Wash and dry about a square yard at a time; do not flood the whole room at once. Strong soaps will eat the pattern in the printed linoleum and wear the inlay.

Use elbow grease!

Use glass casters on heavy furniture as the linoleum will show marks.

Store linoleum, when necessary, away from excessive heat and moisture.

Waxing occasionally is good. But an oil mop does very well.

The numberless designs and coloring to be had in this fabric add to its value and pleasure, and the kitchen can be in lovely accord with the decorations of the house.

The ordinary dripping will not effect linoleum, nor the ordinary moisture. It requires no extra mats as foot resters, is not a substitute but a flooring, and in every way deserves its great popularity.

The Cork Family

Another attractive, useful and popular flooring is what is called the corks. It is made of clean cork shavings compressed in closed steel molds about an inch thick for five hours under high pressure and high temperature. All the moisture is thus driven out and it is pressed together into a waterproof mass. No foreign substance is introduced to bind it together as this is done by its own gums. Inferior cork tile is mixed

with foreign substances and this often makes it break down and detracts from the resiliency and wearing power. After this process is completed it is cut into the desired sizes.

Cork tile comes in shades of brown and there is an excellent cork compound tile that comes in many designs and colors.

It is not absolutely fireproof but is what is called a fire retardent in that it takes a flame of 1500 degrees F. one hour to burn a hole in a tile 6″x 6″x ½″.

The cork tile floor of the best make will last as long as the building. It is of the loveliest coloring, delightful in tone, noiseless and soothing to the feet and back, warm to the touch and altogether psychologically comforting to the nerves.

It requires but soap and water and elbow grease to keep it in condition forever. It is never slippery, is non-absorbent of dust and moisture and when laid correctly needs no effort nor money for its upkeep. This is why the initial investment though larger than for some other flooring is a wise one, as it is positively the ultimate expenditure.

There is much inferior cork tile on the market and it is very hard to tell it from the best quality. It looks attractive until it has been used a little while, then it will begin to "pit" and "sap" (become dark, and emit a pungent odor), due to inferior manufacture.

Heavy tracking does not effect cork tile as it is so elastic that is springs back into place. This is proven by the restaurants, banks, libraries and hospitals that use it so generously.

In laying this, the same general things should be observed as in the case of linoleum. It is laid over felt, the base must be free from moisture, cracks and nails. If the cork is put over nailable material, small headless

sunken brads are used. If not, it is pasted on the base. All joints are pressed together by a special compressing machine, and are sealed with a preparation virtually making the cork tile into one large seamless covering under which no dust, moisture, germs or vermin can collect.

The velvety quiet of these floors imparts a tranquillity to the kitchen, contagious to mistress and to maid.

It is needless to say much for the tile as you know its beauties. It may be cold to the feet, non-resistant and tiring to the back and slippery when wet, but this is overcome by mats of matting, cork or linoleum. Tile is made in every design and color to fit any desire or design. All corners and joints at the base of walls can be curved. It makes a unit of the whole room in design and intention as no other thing does. It can be cleaned out with a small hose. Of course, poor tile cracks.

Needless to say, it takes real skill to lay these floors as the under bed of cement has to be very perfect to protect the tile upon it. However, it looks royal, it wears, and is a favorite with great kitchen builders.

Compositions

The floorings of composition, cements and mineral mixtures are innumerable. Some are excellent, embodying nearly all the good points enumerated in this latter. They are a little warmer than tile and not quite so expensive. They have probably a little more foot comfort but not much more. They are fire proof, do not weigh too much for a lightly constructed house, and are kept clean with the usual elbow grease and water.

These floors for the most part are made in various colors and designs.

In tile and composition the joint at the base of walls

can be made practically one with the wall in a curving connection. In the case of linoleum and cork, this joint is either accomplished by a curving connection or more generally by a highly compressed and sealed joint, allowing for absolutely no trapping of foreign matter and rendering the floor easily swept and washed.

Many great institutions and some private homes have found these to be practical, so if you observe the "Buy the Best from the Best" rule you cannot go wrong.

Linotile

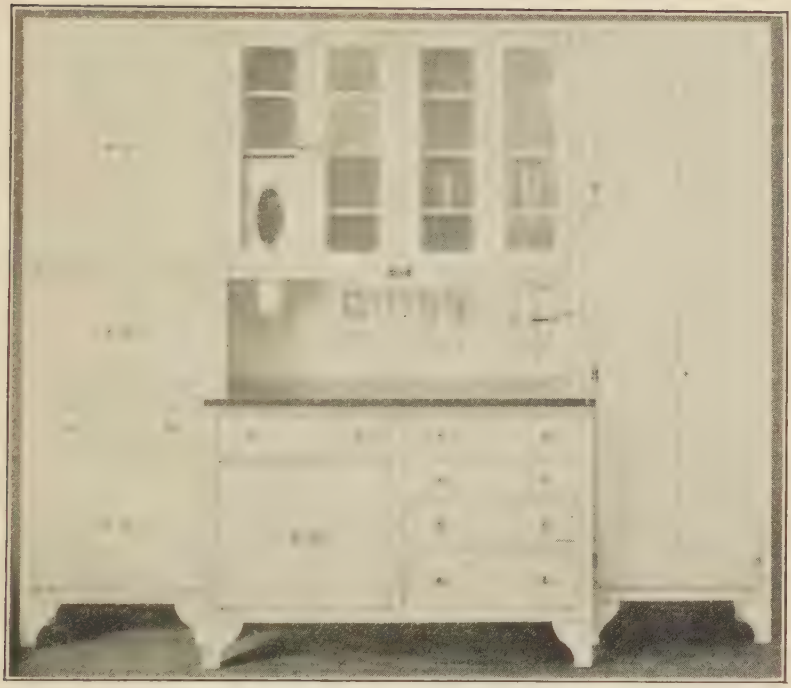
A newer kind of floor is a cross between a cement and a linoleum. It wears indefinitely and can be highly recommended, as handsome as it comes in tile form, and silent, easily kept clean, resilient and all the good points of cement as well as linoleum.

CHAPTER XXVII

FEDERALIZING YOUR KITCHEN

FANCY a carpenter with his tools all over the room! Fancy a painter with one color here and another color there! Do you think we would have had a Michelangelo if he had been forced to get down from the scaffold every minute for a tool or a bit of clay? And yet women for the most part, women who need their energy for making the home a fit place to live in, still persist in scattering their tools about the kitchens and walk miles daily, because they have not mobilized their tools.

To what can be accredited the woman's hatred of saving steps, even though she complains of fatigue and extra work? What can account for the woman's dislike of having her things handy? Is it money? No, because she often buys motors, "movie" tickets, dogs, jewels and garments in quantities far more than she needs. It is perhaps due to a past vastness of ignorance. But now when there are specialists descanting on the glories of saving steps, time and money there is little excuse. In this article one stumbling block will be removed and the kitchen can well transform itself into a room where the most methodical man can work and where any maid coming in for the first time will not have to use levers, telescopes, periscopes and what not to prepare the first meal. For the kitchen cabinet is the first plank in the platform of standardizing domestic work even as it is being standardized in the factory. This is



Courtesy of Janes & Kirtland

A STEEL UNIT KITCHEN CABINET FLANKED BY BROOM AND DUSTER CLOSETS. SEE THE ELEVATION FROM THE FLOOR. THIS CAN BE BUILT-IN TOO

the basic glory of the kitchen cabinet. Now, for the more important details of its makeup.

These cabinets group in one place the necessary tools and materials for getting together the meals of the house. They hold the spices, flour, sugar, bottles, pots and pans, sometimes linens, ice and gas or electric stoves, packages of cereals, etc., and they are the table, the bread board, the flour board, the flour bin and dish rack all in one.

Here you can work where everything is within arm's reach; you can sit at your work and not fatigue your self. In short, you have a work bench at last and can feel as professional as the carpenter or the artist, and you must, if the kitchen is ever going to be as important in the life and best living of mankind as it deserves to be.

Built of steel entirely in some cases, all wood in others, and a combination of both in still others, they are comfortable and worth while in the best makes. Of course in this product, as in all others, one must go to the best manufacturers who know their business and take an interest beyond the sale.

When you buy a kitchen cabinet you must get the maximum comfort and utility. Go about and see which one you think will save you the most work.

The all-steel cabinet, of course, is less responsibility to keep free of vermin. The wood type is a little more care.

If your cabinet is to be of wood, see to it that it is ant proof (the castors as well), has all round corners, is varnish and finish steamproof, has locks that lock, doors that easily open, whether one leaf is shut or both, whether it is winter or summer, supplies a broad enough table to sit down and work at comfortably, a table top impervious to liquids, grease and heat, sanitary glass drawer pull, dovetail wood joinings, easy rolling castors,

everything easily withdrawn to clean, and of non-warping, well-seasoned wood. The finish must be the best, whether enameled, painted or varnished.

In the cabinet of steel construction you must be sure that the enamel is on to stay; that the doors, drawers and locks are of the best construction, electrically welded. The doors, etc., must be rigid enough not to emit hollow sounds every time they are closed. In the best type the doors do not dent or wobble but are double, about $\frac{7}{16}$″ thick, reinforced on the inside with heavy steel angles, making them rigidity enthroned. The frames are rabbeted to receive doors and drawers, thus giving no overhang but making a flush surface. The doors in the steel cabinet are more comfortable to handle if they are hung on concealed brass hinges, with bullet catches which enable the doors to open and shut absolutely independent of each other.

In both the steel and the wood cabinets the table tops are all of different material. The best steel type in our opinion uses nickled zinc; the best wood cabinets use porcelain, iron, aluminum, vitreous steel, enamel, etc. Any of these tops are good and when in the standard makes you can be very sure that they have been well tried and not found wanting in any essential quality.

In general, then, the cabinet is a receptacle for the most used things in the kitchen; therefore, is so much used itself that it cannot be too good and should be adapted to your special need.

If you are building a house and want to have your kitchen a real comfort, install a kitchen cabinet or go to the firm that, with its unit system, can make up a kitchen cabinet combining most of the best things you see in any. This is an expensive way but a miraculous joy. If you want a cabinet to be installed before the house is

built it is a saving in wall tiling where the cabinet is placed, especially if the cabinet is made of steel.

There is one cabinet on the market that has an ice box in it, which when installed with the back toward the porch wall makes it possible for the ice to be put in from the porch and all packages delivered from the porch through its parcel-service shelf opening on the porch!

In this cabinet there is, too, room for a gas stove or electric plates, so that with it you have a complete, compact kitchen.

The unit systems in steel are most elastic, as they can be duplicated over the broadest and the narrowest, longest and shortest kitchens. Whole pantries can be equipped with them. Diet kitchens in the upper floors of large residences can also be equipped with these units so that any member of the family, nurse or valet, can prepare a little meal with everything comfortably housed in the pantry cabinet. They are one of those examples of household developments which are so rapidly coming to the front to-day and mean so much in convenience.

Each maker of kitchen cabinets has a specialty or two which he tells you makes for superiority. Each one is right, so you must choose your favorite and most appealing speciality and buy accordingly.

Some, to obviate the little back bending, have a device by which the whole shelf of the bottom of the cabinet pulls out when you open the door and enables you to see what you want without strain, or time loss. This we think a delightful device. Others have gravity locks and catches which always fall in place; sanitary leg bases, high enough from the floor to sweep under; a rolling open front, which makes it simple always to keep the cabinet closed and away from

cooking odors; white enamel interior; roller bearing on table so that the table rolls in and out with least possible rebellion or noise; and a drawer for kitchen linen, which is a great comfort.

Another advertises the possibility of its use with detached gas or electric range, its silver drawer, bread board, parcel service, and ice box and special flour bin. All the cabinets are proud of their flour bins and sifters. And nearly all have special construction so that they are filled and emptied with ease and dispatch.

One fine cabinet has a revolving spice container which is very convenient, of course.

The unit system is proud of the adaptability to any need, including even broom closets on the side of the cabinet, filling any wall space. These are usually made of steel and provide a cheaper method of backing up one side of the kitchen than by the use of tile or kitchen shelving.

The steel unit systems also come in special "store" sizes and are not much more expensive than the wood.

The steel are either 6″ from the floor to allow for cleaning or are stationary and are attached to the floor by curved constructed tile or linoleum, which gives continuity and unity, thus reducing the swabbing out of the floor to simplest terms.

The kitchen cabinet that is put in when the house is built, be it of wood or steel, is more convenient than any other closet, as no builder has given sufficient thought to maximum utilities. We have seen architects send their "handy man" to install closets who seemed to be absolutely unlearned in the necessities of the problems. Therefore, before and after building, the kitchen cabinet or the kitchen cabinet unit system is by far the best policy to pursue.

The Essentials of the Cabinet

The cabinet must be able to fulfill these conditions: It must be easily moved if on castors, it must be easily taken apart, drawers must run smoothly, racks to hold things must hold things, they must hold enough things, too, to prevent relay kitchen races.

The wood cabinets are excellent, the steel we think a degree more self-protecting because they cannot absorb odors, or get vermin investitures. However, the best grades of wood cabinets are so perfect that we can endorse them ungrudgingly.

The cabinet must have: Supply closets, china (nearly every case), molding boards, work table, cutting board, linen receptacle, pot, pan and lid holders, bread, cake, spice, sugar containers and flour and bin shifter devices.

All other departures are specialties and are more or less inviting according to the buyer.

There is a cabinet, remember, for any space as well as purse. Get the best of the best dealer and make yourself sure that the one you are getting is the least complicated and the easiest to keep clean. They range in price from around $50 up to the thousands. But no matter what they contain, or how thrilling they look, unless the cabinet itself is the acme of fine workmanship, you will be in constant irritation over warping parts, dust and uncleanable surfaces.

CHAPTER XXVIII

WHEN THE POT HANGS HIGH

MY text is "one kitchen tool hung up is worth two in a low cupboard"—taken from The Kitchen Libel—Chapter 1, Verse 1.

This may not look like a technical chapter—like one with a lot of mechanical information—and it really isn't—it intends to get behind technicalities and be a radical (don't fear the word) over-hauling of women's opinion on the disestablishment of old forms of kitchen usage by very slight changes in kitchen arrangement.

For years kitchens have been built with closets for kitchen pots built in "below the belt" with pernickety little doors with cranky little locks. For years these closets gave the kitchen denizen or housekeeper herself all the rhythmic exercise necessary to the development of backache and nerves and sense of touch. Into these closets you had to feel for the pan you wanted and then often had the musical treat of hearing them crash down behind something, and you must needs kneel in prayerful posture to extract the necessary pot or pan.

If there were ever a condition in the kitchen so uncongenial to the Woman-Doing-Her-Own-Work, it's this hidden pot and pan game. If the carpenter has learned how to save his back, why not the housewife, who not only does cooking but also a hundred other things.

Avaunt ancient superstitions and affections about dark low-set closets and come out in the open on high with your utensils and whether you have a maid or not,

some one's back will be preserved, if not for higher for more things!

The Argument for Hanging

I have written the above in the past tense—but it is really existent to-day in the majority of homes. "Why," I asked a splendid housekeeper, "don't you seal up those dark receptacles and hang up your utensils?"

"Gracious," said she, "if I hang them up they'd get all dusty and it wouldn't be sanitary. Ridiculous," quoth she!

"But, my dear friend, do you think those dark closets are dust-proof and do you think darkness is a germ killer?"

The truth is these closets, away from light, are almost ominous!

"But," continued my friend, "if I decided to hang my things up, where could I do it in this tiny kitchen? It's all right in modern kitchens, but here it is impossible!"

Here she touched a universal note—in fact, two notes—the old fashioned kitchen, and no room. Two notes upon which the housekeeper plays monotonous choruses to excuse modern advances.

"My dear friend," snapped I—"once upon a time I ran an experiment station in a tenement kitchen—the kitchen was four feet wide by ten feet long—in it were tubs, stove, glass closets under which were the pot and pan receptacles. I was too busy to stoop every time I needed anything so I had the carpenter nail on the wall over the tubs and over the sink a piece of wood three inches wide (this will go in even the tiniest kitchen) into which I screwed hooks, and there I hung every tool I used. Later I had a shelf nailed above it and made

my work a smooth performance. I felt like a carpenter working at my bench with all my tool 'en plein air.'" And I went on to say, as I had a good opportunity, there is no reason why your kitchen can't be made like a tool chest. No man would tolerate breaking his very strong back to get a pan, or his nerve to pull out a drawer, which so often sticks, for a can opener! Not he.

Could you imagine a carpenter, a butcher, or any one else, who worked at everything requiring sharp tools, or fine quality tools, jumbling them all up together in a drawer that moves in and out, provoking an earthquake rhythm among the tools, or a little closet in which everything is banged to pieces and has to be groped for?

Good Tools, Good Treatment

No!—No one could. Because no tools will last under such treatment and good tools are worth keeping—and the very best are reduced to nothingness if not kept well. It's a case, pure and simple, of noblesse oblige.

There is a good housekeeping reason, too, for things to be hung up, and this is: when things are in plain sight they become a constant curse to the cook or to the beholder if they are not scrupulously clean. In the kitchen of "suspended animation" you are pretty sure to have clean and spotless pots and pans, to have knives whose edges are not nicked, and to have egg beaters and mayonnaise mixers that are not so out of kilter that you get nervous prostration in coming in contact with a scrambled egg or Russian dressing. These are facts to grapple with.

To prove it, just visit a man-manned restaurant or hotel kitchen some time—and there you will see the brightest, cleanest looking copper, aluminum, nickel, etc., etc., pots and pans hung up on racks near operating centers—ready to be used. If this were anti-hy-

giene the Board of Health would intervene. Anyhow, water is at hand in a kitchen and dust is easily swabbed out!

Of course, in the new kitchen, racks are built, and you have no choice, so you accept the pleasanter condition without cavil.

In this connection I can't forbear to mention the apartment garbage can which owns a hygienic lid which sits a foot above the floor and for every useless egg shell to be thrown away the worker must needs bend double to remove the lid, empty her plate, put on the lid and raise herself up. Time and energy lost. This could easily be on a little stool under a common kitchen table in which a round hole could be cut, or alongside the garbage creating table and the stuff slid into it, if it can be bought with a sliding lid. There is also a pail whose lid is lifted by a pedal worked by the foot.

Hanging Within Reach

To be sure, this does not mean to hang up the kitchen table or the stove, but it does mean to keep things, that are used hundreds of times every day, within the reach of your hands without superfluous stooping and bending. It means, too, that cleaning utensils, such as brooms and dusters and rags, if hung in separate racks in or outside of a closet, will live longer in good condition than if hurled into a corner of a closet where they get smashed and have their one hundred per cent. utility diminished.

Where a culinary tool decreases in efficiency, the human element effort is necessarily increased, and unnecessary fatigue ensues—then: sloppy preparation of food and then, dyspepsia.

Now, don't you see the inevitable result of slipshod kitchen arrangement?

If, for any reason, you like closets for pots and pans,

have glass doors on them and have them no lower than thirty-two inches from the floor. This way you don't have to stoop, the light penetrates, and an arrangement like this has only the opening and shutting of the door in its disfavor and the fitting in of the utensils each time and their possible denting. Even the finest utensils will dent with improper provocation. Open shelves are very convenient, too, if you do not care to hang things up.

If you have a niche for each tool, the work becomes almost play.

CHAPTER XXIX

BRUSHING UP ON BRUSHES

HOUSEHOLD work is drudgery unless it is put on as nice (I say "nice" advisedly in its purest sense) a plane as any other craft. The best way of doing this is to have tools that are adapted to the different kinds of work—and furthermore, and quite as important, tools you are proud of, proud enough to keep well and advantageously.

The carpenter does not use one kind of tool for everything—he does not use a chisel where a plane could be used not only to better the job but for his own comfort or pleasure. The same thing can be said of the painter, who would not use a whitewash brush for a varnish job. But the housekeeper seems to think it part of her duty, somehow, to use a one-for-all tool, and then wonder why her work is irksome and her job ill done. It is very often difficult to get a maid to use the proper brush, but you will find, if you do your own work, that you will simplify it by using the right brush at the right time. The long handled type for long distance work, the short for local jobs, soft ones for delicate and so on. This careful work too will preserve the finishes of various things which must needs be brushed and save the cost of renewing paints and varnishes.

Brush work in the home is the most pregnable of citadels, but one that can be easily fortified against calumnies by a little attention to what a brush is, does, and can be.

Of course, a brush is meant to brush. The two main classes of brushes in which you are interested are the household and personal. Of these two we will discuss the household and just touch in passing the personal brush (such as nail brush, clothes, etc.), and will not enter into the paint-brush story even though the paint-brush is in household use on a surprising number of occasions.

Bristles and fibers and hair are the brush of the brush. The finest brushes are of bristle and hair and the less fine are of fiber save where bristle would not function any better for the job than fiber. Hair is used in some brushes where fine work and delicate surfaces are involved. For example, the shaving brush is of hair, the silver brush of bristle, the whisk of fiber. A room wall brush, too, is often of hair to save the paper or wall finish.

Bristles come from the hog's (or boar's) back, and the colder the country in which this quadruped roams the longer and tougher the bristle. Therefore, the Siberian bristle has always been the toughest—and the Chinese have come a close second. We get bristles, too, from France and Belgium. The bristles from the United States are not tough, as we kill the hog too soon—for bacon. However, for a soft brush these bristles are very fine. Japan imports bristles and so did Austria before 1914.

The resilient, springy quality in the bristle cannot be duplicated in any other brush material. Due to-day to the disorganized trade conditions, with Europe and Asia, the bristle brush is almost a luxury.

The American brush has been conceded to be as fine as the European or magically "imported" brush, as there is not any place to-day where the home is being

studied by the brush makers as it is being done in America.

Bristles don't break if bent—and the longer the bristle, the stiffer and stouter is the butt end by which it is securely fastened. Therefore all hail the wild old hog!

Horsehair, badger, camel's hair, etc., are ideal materials for some brushes. Many household brushes are made of horsehair, shaving brushes of badger, and the artist's brush is made of camel's hair when it can be had. Hearth brushes are sometimes made of the mane hair of the horse, wall brushes, too; sometimes goat hair is used. Among other brushes made of horsehair frequently are the crumb (table), pastry, bottle and dish washing (white hair). The very best white horsehair comes from the Russian pony and is very nearly as stiff as bristles. The black horsehair of the finest grade is also imported, as the domestic is not as good. Other horsehair comes from China, Australia, South America.

Fiber or Bristle

When you buy a brush, if you don't know a fiber from a bristle, ask your dealer. He may say: "No this is not bristle, it is made of Bass" (or Bassine, Kitool, Palmyra or Palmetto or Rice Root, or Mixed Fibers, or Union, or Union Marble, etc.). If he is a good dealer you need not fear, if his price is not very low you need not be suspicious, because no good brush is inexpensive to-day and no cheap brush is a saving.

Of all the fibers Tampico (from Mexico, Central America largely), the product of a species of cactus plant, is probably the best fiber. Palmyra, too, is an excellent fiber, and comes from a plant indigenous to

regions near the Indian Ocean and the Valley of the Tigris. What geographical scope we have in our homes!

There are trade names for fibers such as Ox fiber, a fine quality of fiber from the cabbage palmetto, and many other trade named fibers which must be procured by ye purchasers only from purveyors of royal lineage.

Brushes are made of mixtures of bristle and hair, such as some flesh brushes or hand brushes, the bristles taking the brunt of the action and holding the water better, yet protecting the hair. Fiber and bristles are sometimes used in combination, too.

If you buy an "all bristle" brush you don't want a mongrel variety. If it is a mixture you are getting a usable and amply priced brush.

Black bristle is often made into pipe, window, stove, wall, radiator, milk bottle and percolator brushes.

The color, black or white, of bristles doesn't stamp quality. In some cases black bristles are bleached for esthetic reasons. For example, a white tooth brush is more attractive. The natural white bristle usually comes from China and the natural black from Siberia.

Fibers in browns and whites, blacks and whites are mixed in brushes for appearances. Color in brushes is a matter of attractiveness and does not alter the usefulness or the wear of them.

The number and variety of brushes on the market are tremendous—one firm makes sixty-nine ordinary household brushes, and besides this has others tucked away, to say nothing of the personal, industrial and professional classes of brushes. Thousands is not an exaggerated figure to apply to the variety of brushes for all uses on the market to-day.

Another firm shows twenty-nine different kinds of scrubbing brushes (all of fiber—Palmyra, Rice-Root,

White Tampico, Ox Fiber, Palmetto, etc., etc.) of varying shapes, sizes and color. The object being in every case for the purchaser to buy the brush that fits the hand and the job.

Brushes Must Brush Only

Brushes, like any other implement, should do their own jobs only and nothing else. A brush that gouges and does a chisel's work is a poor brush, no matter what quality the fiber or brush mark. The brush you buy for your wall or your hardwood floor must not scratch, and must have nothing in its construction that can scratch. Likewise, the brush you buy for your toilet bowl must not scratch or wear the enamel and the bristles must be bristles, for if of fiber you will have your brush acting like a blotter. Your brush must clean and brush, it must not become a bacteria nestling haven.

Brushes bought for the radiator can get under the piano and into small spaces, but they are still brushes and the more things they brush the better, of course. Furthermore, bristles in a stove brush should not be stiff enough to engrave designs on the nickel-work on the stove.

The same may be said for the pot-scouring brush. It (if made of fiber or bristle) must not chip enamel or aluminum by any part of its construction.

The brush that fits its works, saves time. For example, the brush that is meant for the toilet bowl should be shaped to fit the toilet trap. It should be so built that its wire will not rust; after it is shaken out it ought not to drip when hung up; the bristles should not mat or separate and should be so made as to bend to your will. If it is of fiber, this brush will mat and become of no avail in short order. Such a brush can be used as a

bath-tub cleaning brush and will not break the back when functioning.

Baldness is the worst disease of bad brushes. Bristles and fiber must be stitched and anchored so as not to shed. The frosting brush would be a danger if a bristle were swallowed with a bite of cake. You probably know the agony of a clothes brush that sheds bristles. The backless twisted-in-wire brushes give brush area on all sides, and are so secured that the bristle is fixed indefinitely. The brush that is all brush, which has no emerging back to scratch, and which brushes at every angle, saves time and extra effort, too.

The Protean Vegetable Brush

One of the most useful brushes on the market is the vegetable brush. A little brush whose uses are many. If there are a few in a household they can be used for washing vegetables, scraping silk from corn, scrubbing poultry, scouring pots and pans, cleaning white shoes, sprinkling clothes, for they hold enough water and scrubbing dishes.

For the kitchenette to-day the sink brush and dish-washing brush with their long handles are a boon for the housewife as she can keep her hands in condition by not getting them into hot water so constantly. These brushes have various other obvious uses besides.

Don't use paper to grease pans or glaze cakes; use a pastry brush. Of course this brush must be made without glue or cement so that it can be frequently washed in scalding water and the bristles still be where they should be.

A brush small enough for the percolater tube is to be had. It is good for teapot spouts, gas burner holes, typewriter interstices, etc.

Among other brushes to which you may need introduction are:

Wicker-Reed. This gets in the tiny places so annoying to clean with mammoth tools.

Refrigerator (or pipe brush). This is a fairy wand to keep off plumbers from your estate. Almost a pipe-dream in its general pipe-cleaning skill.

Hearth Brush. A good utilitarian tool for those owning not only a home but a hearth.

Radiator. Gets around a radiator as if it loved it. Can be used under a piano, etc. Good for chandeliers, under oven or gas stove, etc.

Comb Cleaner. The same brush company which makes the above backless, and twisted wire brushes has just put a little comb cleaning brush on the market. It it like a little lawn mower which travels over and through the comb teeth.

Brush cleaner. This new thing is intended to loosen the soil which attaches itself to brushes by scraping it off. It is made of bone entirely.

Remember there are hundreds of brushes and that they are designed for every kind of thing, and best of all, there are companies who exist just to fit you out with brushes and who will advise you just what kinds to get.

Mops and Dusters

Just a word or two about mops, which are more and more coming to be made of cotton which, though not technically absorbent cotton, does absorb the dust. They are not oily, but chemically treated and so will not hurt the rugs. They should be of wire construction, no parts exposed so as to scratch. They must be of strong, enduring cotton, reversible, washable, with an adjustable long handle, usable for ceiling, walls, doors, windows, pictures, baseboards and floors; good for cor-

ners. The handle should be at least long enough to obviate all back bending.

Of course there is a dish mop for washing cups, pitchers or dishes, and the light weight wet mop, with long handle, of washable, reversible, corner-hunting, absorbant cotton yarn.

The duster that dusts and does not smudge is what is needed. The one that can dust finger marks off polished surfaces, absorb the dust and can get into difficult places without breaking the back or—more important still—the heart. These and many other brushes are to be had for your comfort and for the asking—and paying.

Many times in the use of fiber brushes, whether for personal or household uses, it is wise to immerse them completely in water for one-half minute and set them aside to dry, resting on the fiber face of the brush instead of the wooden back or on one of the ends. Laying the brush flat down permits the entire surface to drain in the shortest possible time. The object of dipping the brush in water before use is to overcome a factory defect which is possible in some factories, for once the fibers of the brush are dipped in water, the water is drawn up into the hole by capillary attraction and rusts the staple which is of iron wire; and as this staple starts to rust, it forms a bond with the wood that makes the anchoring permanent. Should there be one or two loose tufts, they will be cured by the rusting process.

After using the brush, shake out the water and place it face downward or standing on the bristles so that it will drain and dry.

You are particularly interested in the manufacture of brushes, except to get what you pay for.

The handles of your brushes must be comfortable, smooth, long enough in some instances to save your back

from pain and short or small enough to fit your hand. In all cases they must be firm and reliable. The handles are preferably not joined with a swivel joint, as this is apt to turn. The clamp is a better fastening.

In the best grade of household brush most of the handles are of wood or twisted wire, treated so as to be practically rustless.

The nail brush and tooth brushes, of course, are often of French ivory and the handle is so made as to allow no dirt to remain in the handle. Often, too, the bristles can be taken out to be cleaned or replaced. (The hair-brush is a story in itself.)

Brushes must be easily cleaned and cared for.

Brush racks can be bought or carpenters make them very simply.

Above all, you want a brush that brushes, whose bristles or fibers are anchored to stay, whose utility goes with years, not months, whose death depends not on use but abuse, and to whose employing you look forward with pleasure.

CHAPTER XXX

THE QUIET HOUSE

THE entrance to a house is like the tonic chord of a sonata. It gives you the key, the introduction to the atmosphere of the home. You really get an impression of a home immediately upon entering the hallway. It is also true that on entering a house you are lured or repelled by the sounds in it, whether from the house itself or the people living there. If you are greeted by loud voices, slamming doors, creaking stairs, there is immediately the impression that this particular home is not well ordered and that the people in it are not at peace. But if you are at once enveloped by quiet and loveliness, a feeling of peace is suggested and involuntarily we expect to meet a charming family.

The good architect always gives the builder a set of plans that should make a satisfactory house, but, as an eminent architect recently said, "It seems to be the aim of most builders to change every detail of the architect's plan." So it is a wise idea to watch the construction of your home so that when the house is actually built you will find it not only attractive to look at but so well constructed in every detail that there are no complaints to make as to leaks or noise or cold. If a house is built of good materials, is well planned, is well put together, a sense of peace is usually the result. In order to accomplish this, every detail of the house must be considered, the windows and the doors, the stairs and floors.

Due to the high cost of building, heavy masonry is not always used in the division of rooms and the separating of stairs from rooms. Where a slight partition only is required, there are on the market today asbestos, felt, and composition "boards" which render excellent service, and are often fireproof and soundproof.

To shut away a nursery, these light weight, soundproof partitions are admirable. They not only leave a nursery perfectly quiet at night, shut away from all the disturbances of the house, but during the daytime they keep the family from hearing the play, the romping, or the unhappy times in the nursery. Of course, the arrangement of rooms, such as the relation of the nursery and kitchen to other parts of the house, has much to do with the peace of the home. The service end of the house should, so far as possible, be shut away by halls and doors, from too close communication with the living part of the house. Think of this when you are planning your home.

All uncovered floors are noisy no matter how well they are laid or how nicely they are finished. Of whatever your floor is made it should be well constructed, over an adequate sub-floor; if of wood, it should be put down so compactly that there is never a sound from it. But when it comes to quiet you must have the carpets or rugs. Bare floor never produces it, under any conditions.

Metal weather strips! So important are they in relation to comfort and peace in the house that they should really be included in the specifications for the building of a home. Besides keeping out wintry blasts, they contribute much to a quiet atmosphere. In the first place, they help to keep the din of the street from indoors; also when they are applied to the interior of doors, the

noise from one room doesn't easily reach another. Windows that carry weather strips slide up and down easily. And a good word can be said of the weather-stripped door. A door with this silencer about it closes quietly and surely; even if one is in a hurry, the door does not show it. Another device for lessening the sound of doors shutting is a piston noise retarder. It has an air cushion which is attached to the frame of the door and the piston is fixed to the door. This keeps the door from slamming. Screen doors, which are of no use unless they shut quite tightly, should be fitted with this device. Children will bless it and so will the servants in the house. All these things should be considered both as to price and comfort when you are planning your house, so that when you first begin to live in it you find peace and quiet, instead of a succession of irritating worries.

A small device but one not to be regarded lightly, is a set of rubber or glass furniture protectors which, when affixed to the legs of any piece of furniture, make it possible to move it about without noise and without any especial effort. These protectors also save the floor and keep the carpets from being worn and torn. They are easily attached and not expensive.

The "silence cloth" on the dining table, whether made of cloth or asbestos, is another means of lessening disturbing sounds in a house.

And in some homes I have known it to be a rule that all the servants must wear rubber heels. This not only lessens the noise in the house, but it mitigates, to a very great extent, the weariness felt by busy maids who are on their feet practically all day long.

A great deal of the clattering sound in a kitchen can be avoided by lining the cutlery drawers with felt, so that when silver and knives are put away the clashing

of pieces together is avoided. Pantry dresser drawers should be lined in the same way. This lining felt can easily be installed by pasting or tacking, and it is not expensive.

A place for everything and everything in its place is an especially good idea in connection with the pots and pans in a kitchen. Much of the annoying sound from this source can be obviated by hanging the utensils, because most of the sound is due to the falling together of pots and pans as they are piled on top of each other when being put away on the shelves after use.

One of the chief offenders against the charm of the home in the matter of noise is cheaply constructed plumbing. This is not only unsanitary, but at times deeply embarrassing. Good plumbing is an absolute essential in the well-constructed house. Nothing will betray your economy so promptly as plumbing that is not of good materials and well placed. It is necessary to get all your fixtures from the most reputable dealer, and have the best workman put them in, and then you will save money in the long run and charm and peace will envelop the plumbing side of life.

The bathtub with a water inlet so fixed that there is only a little noise for a few seconds or none at all is a point of perfection that manufacturers are making every effort to attain. Perhaps the nearest to it is a device hung very low in the tub so that after the first few inches of water the faucet is covered, and the noise from the inflowing water is smothered.

People who will not endure the slightest rattle or creaking in an automobile will live for months with a squeaking, leaking faucet. A slight adjustment will usually remedy the difficulty; sometimes only a washer is needed. And even an entirely new faucet is not a purchase with very serious consequences.

As yet no way has been found to modify the noise of the telephone without lessening its effectiveness. The telephone is rung to catch your attention and if you muffle the bell too completely you are liable to lose an important call. If you have a very noisy telephone bell in an apartment where every sound is heard, you can muffle it slightly with a little pad of absorbent cotton. This is an especially good thing to try where the sound of the bell disturbs an invalid or little children.

Rugs are a delightful way to reduce noise in the hall. A long runner that goes the whole length of the hall and about half its width will keep your hall quiet for your own house and prevent its disturbing your neighbors. Of course, in a house where the hall is large and capacious, the surface is much more interesting covered with groups of rugs; a runner spoils its interest and a carpet is less intriguing.

Quiet is one of the most difficult things to find these days in the city, and also one of the most essential things for one's work and happiness and health. There is only one way to acquire it in the modern home and that is to look after every detail of your house at the very beginning.

After all, the things that make for quiet are in the main little things. Yet it takes thought, some experience and a good deal of attention to detail at the beginning of making a home, to insure in it that pervasive charm which must have for its foundation quiet throughout the house.

CHAPTER XXXI

OSTRACIZING THE FLY

"TRY my glasses," coaxed a kind old lady, when her young friend broke her own bone rims. And she did. But she was far from happy—in fact, quite miserable; and her eyes took a long time to recover from the ravages of the ill-fitting glasses.

Naturally nobody should use glasses made for another. Glasses that have been more than carefully fitted to the individual's eye are none too good if comfort and eye ease are desired.

So it is with the installation of screens. It may sound queer to compare eye-glasses and screens, but nevertheless the analogy is nearly perfect. As the eyes vary, so do the apertures of the various homes. Therefore, unless screens are fitted carefully to each window, door or porch there will be discrepancies, and if one fly or insect can get in others can and there will be not only discomfort but probably disease distribution.

Swat the fly? No! Don't give yourself a chance to swat it. Keep it out!

Therefore if you have a house to screen do it the best way you can or the money spent will be a dead loss. They must be bug-tight even as a ship is water tight; unless they are, you will be the host at continual insect balls and chairman of the rust convention and store up for yourself an irritability unprecedented. For there is no more annoying thing in the home than recalcitrant or obstinate screens.

It is strange that any missionary work need be done about screens because almost every one agrees upon their uses in health prevention and comfort assurance, yet withal the purchasing of them is done ignorantly and as carelessly as the young woman who uses anybody's glasses for her own particular and peculiar eyes.

To begin with, do not order screens to be made "right away"; they cannot be done in less than a thirty-day month and be made with any finish. Order early enough after you have received estimates from the best screen makers; then take the estimate which gives you the best value after you have either seen the models, actual installations, or are satisfied that you will get the thing that you need for your particular case. The skilful screen men treat your case as individually as the oculist treats your eyes.

Your screens should be:

1. Simple to manipulate, should pull up, lower, raise or thrust out, easily and happily, and should be simply removed for storage if necessary and uncomplicatedly re-applied.

2. All the hardware should be inseparable from the body of the screen—that is: catches, bolts, locks, etc.

3. All the metal work should be rustless and adapted to the region in which you live.

4. Frames must be rigid and wire cloth taut, well fastened at every point in the frame, not sag, and be rigid.

5. Wooden frame screens must be of kiln-dried, seasoned wood, and when expedient, of hard wood.

6. Renewal of wire cloth must be a simple matter without an armory of fancy tools.

7. All should be neat, attractive, matching the window, door or porch trim where they are placed.

8. They must be a pleasure to use, not limiting the

use of the window or door screened, nor breaking the back or arm when in use.

Screen frames are made of metals and of wood. Due to the architectural design of some windows or doors it is necessary for a wood frame to be used, and for the same reason it is often wiser to use a metal frame. Wherever metal frames can be used they are the best to buy, as they will stand up longer, and, if the best be bought, they will need less renovation, as they can be made rigid at only half the width of the wood screen. Furthermore, you get more ventilation than you do with the wood-framed screen. Of course, you want air and as much as you can get of it; therefore the narrower the frame the more perfect the screen.

The metals used in frames are pretty much up to the quality of your screens' maker. They are to be had of bronze and various concoctions of bronze dependent on the patents of your purveyor; of grass finish, copper finish, steel enameled; steel painted; steel grained to look like the wood trim, steel galvanized and steel regalvanized; monel metal.

To be honest, there are two better classifications of screens: those that are rustless and those that are not.

Monel metal is used for seashore houses, as the salt air does not corrode or corrupt it. Variations of the bronze screen are also adapted to seashore use.

The painted steel screen has to be painted over and over again to keep it from rusting and wearing out.

The galvanized screen is practically rustless and the re-galvanized is quite positively an insurance against rust.

Be sure that when you buy a bronze frame it is not simply a bronze steel frame. Steel invites rust, and the way to have a rustless screen is to make steel an absentee or galvanize it.

All the hardware must be of non-rusting metal. No doubt, as soon as the rustless steel is on the market in large quantities, screen men will be using it instead of galvanizing, painting, etc., and using it and bronze and monel metals for hardware.

Some Details

The corners in the metal (and in the wood frame as well) have to be of exquisite workmanship. The best types have no screws or rivets or plates or projections of any sort, yet are of a perfect interlocking or welded construction and hold the screen cloth at every point with infallible tenacity.

There is no aperture so shaped that it cannot be framed in screens by the ablest screen makers. In the case of the metal screen the bent work is really a work of art, in that they are not puckered or pinched, but are *sans* humps, *sans* bumps, *sans* everything but beauty, rigidity and conformity to conditions.

Every screen manufacturer has his own scheme for fastening the screen cloth firmly in both metal and wood frames. The idea is that the cloth must not sag in the frames, on the largest openings in doors or windows, porches, etc., that when either whacked by the children or inadvertently struck by adults, the cloth will remain taut and rigid and stay in place in the frame. The tubular metal frame in this connection seems the most logical metal frame. It is lighter and as strong as the other types of metal frames. It is so admirably contrived that the cloth can be removed without an extra tool and the springs and slides can be very conveniently and admirably fitted.

The tracks or slide upon which the metal frame works must be a slide and not a series of sticking points. This means good workmanship.

Another advantage the metal frame has over the wood frame is that it does not need the disfiguring hinges; if hinged, it can be hung on the pivot hinge which leaves no scar, and is inserted in the casing of window and leaves no trace. When it is to be taken down for the winter it is simply lifted out—no pins to come out of hinges and no unscrewing.

Varieties of Metal Screens

The type of screen is of course dependent upon the kind of window or opening you have to screen. The usual types are: sliding and rolling, casement and stationery.

The sliding screens are usually used on the double hung window and slide on a slide. The best slides are of metal backed by wood. A double hung window can be screened by a single screen or a double one, dependent on the wish of the purchaser. The double slide is necessary, of course, in the case of the double screen.

In this connection it is interesting to note that there is a new type of window lately on the market that arranges in the head of the window a space into which not only the screen can disappear but the window itself, and be out of the way. This of course allows for a completely open window even more so than the casement.

The pleasure of the slide screen is in the fact of its sliding and not catching in a series of struggles to make it work. Springs and tubular grooved frames complete this type. If the springs get out of order in a tubular grooved frame, they can easily be taken out and restored without special tools. They are protected also from wear and rust and made so as to withstand atmospheric ravages. A safety device should be provided to prevent the spring from accidentally disen-

gaging itself. If the screen is hung inside the window, one hand lift is sufficient. If it is hung outside it is well to have another on the inside to be of service when removing them for winter storage.

Rolling Screens

The acme of screen perfection is attained in the rolling screen. At present this type is creating the interest it deserves, as it is adapted to every kind of window and can be kept on the window throughout the year.

The screen is of metal and rolls up on a roller like a window shade; it is of simple construction, durable and non-rusting. It is light and rolls with great despatch. Some of these shadelike frames can be raised and lowered at any point on the window frame; they are rigid, do not sag on the broadest of windows and are equipped with non-rusting metal, and are either of monel or bronze in fittings and framing. The track in which they slide is also non-rusting and holds the screen well in place. The screen cloth is of the best mesh and is tightly fastened at every point in the frame.

The fact that these screens are inside the window leaves them free from the ravages of the elements, which is another point in their favor. Some of these screens are supplied with a cord like a shade that pulls up and down the same way. Some of these roller screens have employed zinc on all exposed parts, and this is a rust preventive. The same brand employs a waterproofed fabric less expensive than metal, also bronze, copper and monel metal.

One especial type of rolling screen presents an advantage that is very desirable—it has a patent side grip for the edges of the monel screen cloth and a

Courtesy of Rolup Screen Co.

THE SCREEN WHICH ROLLS UP IS A COMFORT AS WELL AS A SAFE AND SANE INSECT OSTRACIZER

perfected runway in which travels a series of metal clips holding the cloth and so arranged as to roll up without difficulty. The screen roll is assembled in a zinc casing, made exactly to fit the window, which is easily attached to the "stops" at the top of the window frame and, when painted or stained to match the trim, looks like a part of it and is almost invisible. The two side "runways," also of zinc, are screwed to the window "stops" like weather strips and are painted or stained in similar manner making them entirely inconspicuous.

The window shade is then replaced just below the screen casing and neither interferes with the other.

The screen is so adjusted that it easily pulls down or pushes up at will, automatically locks itself on being brought down to the sill, and, after being released by a slight upward push remains in whatever position it is left. It covers the whole of every window and is so simple in construction and direct in action that, once installed, it should never get out of order. In case of damage it can easily be removed, new parts obtained and as easily be relocated. In new houses, under construction, provision can easily be made to "sink" the screen casing and side runways into the window frames so that they are almost invisible.

If the rolling screen is not used, the casement can be covered with top-hung outside screens, side-hung, double-door style, or single from one side or stationary on the outside, if the window opens inside. When possible the casement screen should be hung on pivot hinges to permit ease of detaching for storage, and, as we said before, to leave the window without the marring of the hinge there or removed. However, frequently in the case of the unusually large screen the use of a little strap hinge is sometimes necessary to carry the

extra weight. In marble window casing the hinge of course is an impossibility.

A couple of side levers on either side of the screen for releasing the pivots when the screens are to be taken off for the winter make the matter of removal as easy as "falling off a log."

The top hinge screen on the outside of the window which pushes out from the inside has to be hung very securely and the bolts and pivots and handles and adjusters have to be made to perfection. The adjuster for pushing this window out or open must be a pleasure to use or else this type of screen will be a curse. There is an adjuster now on the market that is put on the window in such a way that the screen can be opened or closed without opening the inside of the window. A double insurance against inroads of bugs while opening the window to adjust screen!

Put up to "stay put" stationary screens are fastened with bolts which are removed when necessary to store.

Wooden Frames

The story of the wooden frame is about the same as the metal, only that the wood frame can't rust, but can wear out if not seasoned and kiln dried and given all the care in manufacture that long life in woods necessitates.

Here, too, the corner construction must be perfect, must be able to bear the weight of the screen and take out the jars. The frame must be rigid, light and strong. The wire cloth must be so fastened at every point that there is no sag or bagginess in the broadest window.

Now all this is possible in the best wood frame screens and with good workmanship. Every one thought for a long time that the metal screen could not incorporate their good points. Don't be fooled by some

one saying that the wood screen cannot be made "fool proof," for it can and is. Here again every maker has his own device for catching the metal cloth; here again the metal cloth must be rustless; here again the metal work and hardware must be rustless, the screen must make easy manipulation possible.

The screen door question, too, is rallied round with the same provisos of manufacture as metal and wood screens. There are the two leaf door and the one leaf.

The new thing on the door is the fact that the whole door may be screened or only one-half screened, the rest of wood or metal. Yet it is far better to have the whole door screened, but for the sake of beauty and lack of monotony the lower half can be guarded with a metal panel which will not only look well but protect the wire cloth. Sometimes, too, in the wholly screened door just a metal guard rail is applied to prevent injury to the wire cloth on the full expanse of a door.

If half the door is of wood, there again you lose the free entry of air, so it is advisable to screen the door completely and use the guard metal work to beautify and protect it.

Some of the lower portions of doors (as is the case with French windows) are beautifully carved to be in keeping with a handsome wood interior.

Doors, too, should be equipped with a good check to prevent them from banging and close tightly.

Locks or no locks, are questions to be decided by the buyer, but all hardware, belts, catches, pins, hinges, etc., should, of course, follow the "no-rust" régime, and be of the most durable stuff and match up with the surrounding hardware.

Even though the frame and its hanging are of vital importance, yet what would the screen be without the

screen cloth? And, of course, there are as many kinds of cloth in this quarter of the world's work as in any other and you have to know something of the variety in order to know what you are buying, to buy advantageously. Here again you play the old tune: Rustlessness.

The cloth must be of a mesh not too fine for free entry of air, and fine enough to prevent the smallest insects from entering. But here you must use discretion. If your home is in the Adirondacks where black flies and midgets precede the mosquitoes, then it is the better part of wisdom to use a finer mesh; if you are at the seashore, the ordinary coarser mesh is sufficient.

Wire Cloth Varieties

There is also choice here. You can have:

1. Painted steel cloth which must be repainted often in accordance with its exposure and in regard to where it is exposed and whether it is hung inside or outside of the window.
2. Galvanized steel mesh: This is often blackened for eye ease.
3. Monel metal (an alloy of copper and nickel) guaranteed rust proof, used mainly at seashore resorts but good for any place.
4. Bronze and patented bronzes: Used as is the monel wire cloth. Here a coat of paint to dull the bronze glare is of real service to the eye.
5. Copper: A coat of dull paint here, too, will take off the glare.

Manufacturers have various bronze cloths and they are sold under various names. Its great use is imperviousness to rust but it has to be of the best manufacture to insure this paradisiacal condition.

The porch that is screened with pernickety screens

never is screened in time to reject the insect world. So here is another case where they must fit and be made to order.

What is a sleeping porch without a screen? Without a functioning screen? One swallow may not make a summer, but one fly can make torture out of night.

Some makers will key your screens so that each screen has its tag for replacement and there is no loss of effort and time in resetting them next year in their proper places. This can be done in windows, door and porch work. Of course, with the rolling screen—they are never taken down and much labor is saved.

Screens are not a luxury; they are a health measure. When we get more civilized we will probably have our screens inspected to see that they fit, and the boards of health in the various towns will keep a close watch on them, for diseases are rapidly being traced to the minute insect carriers. Typhus and yellow fever are the last results. Think what Central Europe would have been spared had it been properly screened!

Contrary to usual opinion screens can be most attractive and fit in with the surrounding wood trim, and be a department of house furnishing not to be belittled. And don't fail to realize that a lot of trouble can be saved and unsightliness be avoided, if the screen is thought of before building your home—and if the roller type is installed, you have no storage care, or removal and recurring slavery.

CHAPTER XXXII

POLISHING THE WATER SUPPLY

"I FOUND a fish in my bath-tub to-day," said I to a friend.

"Wasn't that the best place in the house to find one?" was the reply.

"Yes," I said, "but I can't say I enjoy bathing in an aquarium, and my civic pride is hurt because I have been so proud of my city's water quality and all of the sister municipalities which filter or chlorinate or both."

In this anecdote is the crux of the filter situation.

In times gone by a filter was sold to save life from polluted waters, from streams, wells, surface sources, sewage-burdened rivers, etc. It was a dire necessity and became by its efficiency or lack of it a godsend or a menace. If it were a good filter it needed care and attention in the greatest degree to make it a boon; if it were a bad filter it continued despite care to be a curse far more dangerous than the unfiltered product because it became a collector and a breeding place for bacteria and doled out water as pure to the most modest of drinkers.

But as with every department of living in this realm, things have moved on. In this case gloriously. For since the municipalities have taken our lives in their hands the dangers from bad filters are slight and the need of good ones necessary but not a life-and-death matter. In short, the excitement about filters in the home is dead but their use goes marching on.

However, as this story will be read by inhabitants of unfiltered municipalities and towns, whatever danger and comfort can accrue from non-filtration or filtration of water will be evident after a glance at this attempt to bring it to your mind. Just as this goes to press we see in the paper that a western town of Salem has seven hundred and eighty cases of typhoid in a population of ten thousand. Here is food for thought!

Hundreds of towns (one firm alone has installed about 163 plants) in the United States have municipal filtration plants. Some even oxygenate the water by fountaining it esthetically skyward and allowing it to entice to itself oxygen (from the free air), by which it gets life and polish and becomes refreshing.

Some towns chlorinate the water supply. When water is chlorinated, minute quantities of chlorine are added which absolutely destroy the germs in the water, but do not alter its chemical or physical characteristics in the least. The difference between a water that has been chlorinated and one that has not been so treated is that in the first case the germs are destroyed, but in the second case they remain in the water to cause possible disease.

This process is rarely used in the home as the control is too difficult. But in the case of the elaborate residence with large incumbencies in the way of model farms, dairy, stables, machine shops, etc., it is used. Also the smallest plants are used in the case of large swimming pools in and out of fine residences, where, of course, the water has been found to be bacterially degenerate and where the work of purification is not done by a benign municipality.

To get to the roots of the matter you want water (you don't care what the high-browed engineer does to it) to be:

1. Colorless.
2. Tasteless.
3. Odorless.
4. Free from suspended matter.
5. With enough oxygen gas to make it refreshing and give it life.
6. Without germs or food for germs.

What you want to keep out:

1. Suspended impurities: vegetable, animal (such as the fish), mineral, microscopical algæ (what you see on the stagnant waters), infusoria, etc.
2. Dissolved impurities.
3. Disease germs: typhoid, cholera, etc.

What you must demand in a filter:

1. All the above.
2. Durability.
3. Simplicity of management.
4. Nearest approach possible to self cleaning. (The uncertain human element makes many a good filter fall down.)

These four things are essential to the longevity of the filter and to you, if you inhabit filterless vales.

Another thing suggested by the fourth article of faith above is the care of the filter. If you have a maid you can't be sure in what state the filter is, unless you keep close watch or have constant inspection by a service bureau. Slight danger from the nearly self cleaning filter can by care be entirely eliminated. But only with care.

To clarify after its long pipe journey (probably through rusty pipes, etc.); to insure plumbing (in case of the installed filter in the cellar) against clogging, incrustations and general wear, accumulations of material bound to enter the water on its trip through the pipes to the house—due to broken water mains, fires in

the city—accidents of any kind; to give the laundry a clean appearance, for the best laundry work availeth little if the water is murky or turbid; to polish water, or render it free from flavor and turbidity.

When typhoid had its happy hunting ground in plumbing it was thought quite in keeping to have typhoid cases in abundance. In Pittsburgh and other such afflicted towns it is now felt to be a heinous sin, since filtration has become a part of the service that towns render to their inhabitants. In fact, all boards of health to-day feel it to be a felony and disgrace to find a case of such a disease in the community.

So, to public-spirited citizens in unfiltered regions, your task is cut out for you. You can get rid of muddy, dirty water by municipal filtration plants or home filters and care.

For those who live in filtered towns the use of filters is manifest, too.

There are various kinds of filters in use, but only two kinds are of interest for use in the home.

1. The type affixed to spigot (or water cooler).
2. The installed filter placed in cellar or other part of the home to filter the whole water supply.

These are divided into many technical categories, but what you are interested in are the following questions: Do you need a filter? What shall you have to know to buy a filter intelligently?

Rapidly stated, it is safest to buy a filter from a manufacturer who says "my filter is not absolutely perfect but it is the nearest thing to perfection we can get. We know our filter can render water from 90 to 100% free from bacteria, as we have had bacteriological tests made by competent chemists."

When you order a filter, put down on paper the answers to the following questions, and send them to the

manufacturers who will then give you the data and prices. Choose the best manufacturer and then invest:

1. Are the fixtures all on direct water supply or are they supplied from an open storage tank or combination of the two?
2. What are the source, nature and peculiarities of the water to be filtered? Has it odor, taste, vegetable discoloration, clay or iron stain?
3. What sort of water supply system do you use and what of the water pressure? What is the size of the supply pipe? (Ask your plumber.)
4. How many gallons of water are required to be filtered per minute, per hour or per 8, 10, 12, or 24 hours? (Ask your plumber.)
5. How many bathrooms and other water fixtures are in your home?
6. Is there a municipal plant in your town? What kind?

Since 1885 thousands of filters have been patented. Years ago the smallest and most unreliable maker would put a filter on the market and promise immunity from death and let it go at that, because folks are anxious to be saved. To-day not many more than six filters are really sold with a guarantee by reliable firms backing them. Why? Because most of these filters were cheap and flimsy, did nothing but strain water and strain their point as well. These small manufacturers would spring into being one day and sink into oblivion the next. The filters, if they did filter (not strain, only), would become breeding nests for bacteria. Physicians feared and forbade them.

The filters on the market to-day are in varying degrees reliable, depending greatly on their functions, on the amount of care and wear, and how they are used. For example, coarse gravel as a medium through which

to purify water might be good to take out bits of sediment—big bits—but it would not act on the bacteria.

In general, the materials used in filters through which the water must pass to be purified are: sand, quartz, charcoal, cloth, paper, etc. Another class of filters passes the water through a bougis or candle made of unglazed porcelain (Kaolin), natural stone, artificial stone, asbestos, diatomaceous earth, etc. The pores through which the water flows catch the bacteria and sediment.

With this list before you you must ask yourself if you need only a strainer. Is the water free from bacilli? Have you a municipal chlorinating plant or filter plant? If so, any good filter will do to strain out suspended matter; but if you are very anxious to have perfect water you cannot go wrong by having a filter which will catch bacteria which may have accidental entry, in any community whatever.

If you know you have dirty water and no municipal plant you cannot be too careful as to what you use in rendering safe the water from well, stream or any other source.

The most reliable faucet filter is the diatomaceous earthen candle type which is simply cleaned by brushing off its soft surface and boiling occasionally to kill furtive bacteria. The great drawback to this type of filter is that it is not a reformer and cannot force the user to keep it clean. Therefore it is up to the user, and as its agent told the writer, "Filter use in a city like New York is a matter of temperament. Some people enjoy caring for a filter in order to make a splendid water supply fool-proof, others dislike the care and do not mind the slight risk in any city water supply or the discoloration that is often inherent."

Filters, whether installed or attached to faucets, are built to fit the occasion.

It is interesting to realize that nearly every fine home in New York, especially on Fifth Avenue, has a filter, despite the city's excellent water supply. Not so much to save life, as it so often does owing to frequent invasions of germs into even excellent water, but for the feeling of clean unflavored, unfishy, unwoody water and for the insurance of long life of the plumbing system—and to save deterioration in plumbing is a thing devoutly to be wished.

Sand or quartz is the usual medium for filtration in the home. Bone char is often added to these to destroy taste, for there is nothing as disagreeable as water with a decided taste.

There are a few filters to-day which when installed in the cellar consist of one or two vertical tanks attached to the water supply. In one tank is quartz through which the water passes and in the other is bone char to carry away flavor.

In one case the filter has a simple lever which when set at a certain spot on the dial washes out the filter beds and frees them from contamination.

As the impurities in the water are removed by a filter they accumulate in a mass or cake on top of the filter bed. If this cake or matted formation is not broken up and thoroughly disintegrated, it will roll up during the washing process and not only clog but contaminate a filter bed, utterly destroying its efficiency as a purifying medium, steadily diminishing the water supply. Hence a cutting plate is placed immediately above the bed of quartz. As soon as the operating lever is moved to the point "Washing," the washing current is introduced at the bottom of the filter, the filter bed is lifted bodily upward and forced

through the cutter, which literally tears the matted film of impurities into fragments. At the same time it thoroughly breaks up the bed, separates and perfectly scours each grain of filtering material, by the force of the reverse current of water in a space twice the size it occupies during the filtering process.

The impurities having been separated from the bed and broken up into minute particles are carried out of the filter through the waste pipe by the reverse current of water. During this process a screen at the top of the filter prevents the filtering material quartz from escaping out of the filter.

In this way by the least effort—the turn of a handle —once a week—the filter becomes a boon and not a menace. After the cleaning process is over, a matter of from ten to twenty minutes, the lever is turned to another point "designated in the bond" and the filter goes back to normal. The agitated sand and char are calmed down and ready to chasten the next lot of water.

In some localities where the water (though it may be chlorinated and bacteria-free) is dark and turbid and full of the finest sediment, the usual sand or quartz (even with the tiniest of spaces between the grains) cannot prevent this hyper-fine sediment passing through into the filter. In order to catch this impure water with its fine sediment alum is often introduced into the filter to coagulate the fine sediment (as you have seen the white of an egg coagulate coffee grounds) and permits it in the "flock" to be caught as it passes through the interstices of the filter bed.

Here you can easily see why you must be careful to give the filter manufacturer a graphic description of your water supply. Then, too, the installed filter, just described may be rendered useless if by any means the pipes in the home become contaminated.

There are some filters on the market (this caution is for the unfiltered community) which only strain.

Those fitted with paper, cloth, cotton, etc., are fine in their places, but you must know their places.

One filter, for example, is said to be very speedy. However, in this case (this filter is attached to the faucet) you are admonished to let the water run for about half a minute, because, as the water ran through before, the collection of germs must be given a chance to flow out. In this filter the water flows in at one end through bone char and quartz and the next time it is used the current is reversed and flows back through the filter bed, self-washing but carrying with it the bacteria collected on its last passage. Therefore, if you forget to let the water run for a time, you may get your stomach full of more potent germs than if you used the ordinary water with its occasional bacteria.

Good filters in the last analysis spell "safety first" wherever they may be. For despite municipal intervention accidents will happen, and even though the trouble be corrected in a short time, fifteen minutes can prove a real menace.

There is one filter just coming to our markets, made in Germany, which has been tried and tested and found good. It is affixed to the water supply (direct, not in cellar) and accomplishes filtration by the process of passage of water through a paper-like fabric of disks ¼" thick. These disks keep water absolutely sterile in the laboratory for 17 days but the makers, rightly, will only guarantee them for 48 hours in order to obviate danger to their promises, through the accidents which may happen. The test under German scrutiny proved that typhoid germs were rendered nil for 17 days and try as they might could not force their way through the disks.

This is a good certificate of good conduct. Sewage

for example during the war was rendered harmless as drinking material by the means of this filter disk, so it is claimed.

Filtering, unlike sterilizing, does not take the life out of water or make it readily absorb odors and flavors.

Remember, that some filters remove bacteria and the finest sediment only (the candle type). Others remove sediment of all sizes and bacteria, too; while still others kill flavor to boot. Discuss the point with your plumber, architect, doctor and manufacturer and water department. As with clothes so with filters: buy what suits the need and buy carefully after securing all the advice available.

One might say pompously that the purchasing of a filter may be the purchase of life itself, or—facetiously—that the good filter takes the "imp" out of impure water.

CHAPTER XXXIII

OUTSTRIPPING THE GALE

WEATHER strips are not the caviar of the building menu—far from it. They are a whole lot more like the roast beef with pan gravy and baked potatoes.

Those of you who bought weather stripping years ago and either put it on yourself or had the town carpenter tack it on, do not believe it is any good, and at best only a "fancy fixing." But those days are passed and the weather strip has properly outstripped many other things in development and has come to be no hors d'oeuvre but the pièce de resistance of the bill-of-fare. So important has the effect of the strip become that heating and ventilating engineers have been and are to-day carrying on experiments, not to prove their value (no, for this has been proven), but to have exact data to show how much fuel is saved and just how evenly the temperature can be maintained throughout a home under varying conditions of gale and stability outdoors and in. (See Chapter XXXV, Heating).

Things They Obviate

Do you care to heat the great outdoors? This is the first important question. If you do, how dare you with the shortage of coal to-day? Have you sufficient coal to waste it? Is your home hard to heat? Why? Do

you like the gales and little hurricanes racing over your floors, chasing the little snow flakes? Do you like to cultivate colds and other draught diseases?

These are pertinent questions even if they seem impertinent. They suggest the graphic pictures that we do not want inhabiting our homes.

These conditions can be obviated.

If you inquire from your friends who know intelligently the value of the furnishings they use, you will get concrete figures before investing. One conspicuous friend, Uncle Sam, says that in 1918 he saved two million dollars' worth of coal by the use of weather strips. And this led the director of conservation to make the extravagant statement that weather strips are 100% fuel conservation.

What They Are

In the past when the telephone had just become a household staple and before horse cars evaporated you used to paste the weather strips on the outside of your windows. Then they were made of cloth, or rubber or heavy paper, and they made life slightly fair and warmer; but most of the heat accrued by them was that which was fired in trying to raise the windows which stuck due to the adherence of the weather strip.

To-day the weather strip is gentler and not only keeps the cold air at bay, but keeps out the dust and noise and permits the window to go up and down more easily because it runs on a metal track; really the weather strip allows it to glide like magic. To move a window with the weather stripping affixed is a pleasure which the weakest reed can enjoy.

The dictionary says "the weather strip is a narrow strip, as wood edged with rubber prepared to be placed

over crevices, as at doors and windows to exclude wind, rain, etc."

This is the old weather strip. To-day they are in general metallic tubular strips fitting into complementary depressions in metal linings or window sashes that are designed and shaped to seal the cracks that naturally occur between and around doors and windows and their frames, sealing up these openings so that the elements are turned back before they get even their noses into the house. They are made of non-corroding, non-rustable metals such as zinc, bronze and copper, and they keep their elasticity plus non-leakage qualities as long as, and sometimes longer than, the building itself.

Every type of door and every type of window present different problems, and every window or door of each type has again different problems, so to each there must be different applications. The following will explain more particularly than the foregoing.

The Sliding Window

The sliding window is the most general type to be treated.

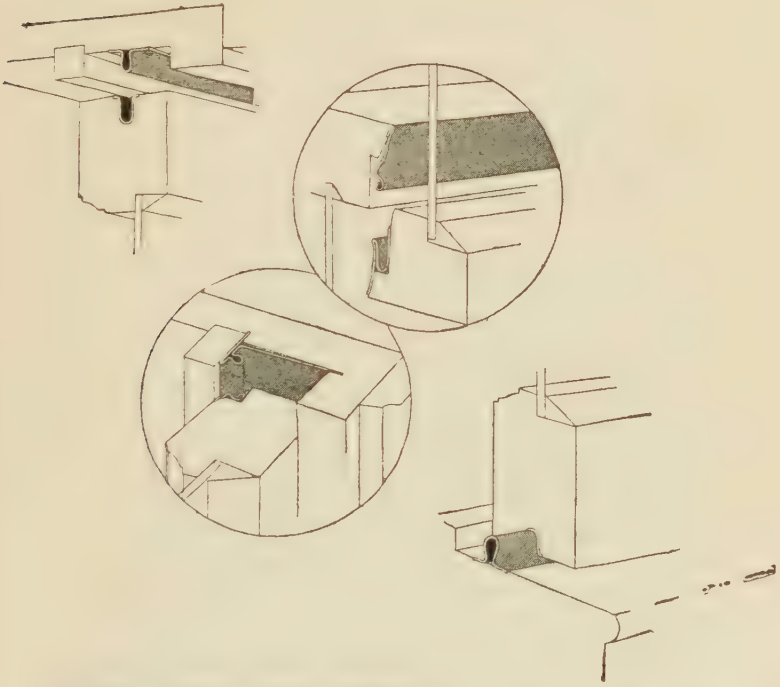
Here the top and bottom, sides and meeting rail must be considered. How to stop leakage and seal against unwelcome callers are the problems.

At the top of the window, as in the illustration, two strips are used; the tubular protuberance in the head of the frame nestles cosily in the depressed concavity of the window sash. Some brands line the depression with metal—others do not.

When the window is closed, there is a complementary interlocking device at the rail where the upper and lower sash meet, often in the upper sash of S shaped bronze and in the lower sash a hook-shaped copper strip.

The side of the frame upon which the window is

raised and lowered is a real problem. The weather stripping makes the window weather-proof, yet it makes it open and shut easier than it could before the application of the strip.



Courtesy of Monarch Metal Weatherstrip Co.

DOUBLE HUNG OR ORDINARY SLIDING WINDOW TREATMENT WITH WEATHERSTRIPS OBVIATES DRAUGHTS, DUST AND NOISE—SAVES COAL!

In some brands the frame lining and sash lining are of metal. In some only the frame is metal lined. In some the frame is corrugated and the window sash slides

up and down easily as the protuberance slides into the depression in the unlined sash furrow. In another brand two metal tubular strips are used, the metal protuberance fitted into a metal lined depression. Here the window slides easily and no amount of warping can disturb the nice adjustment. In such weather strips are created conditions which absolutely prevent the side action of windows, so hard to cure with carpentry or cheap types of weather strips.

The lower sash is managed as is the upper, only the strips are reversed.

Other Cases

The casement window has its peculiarities of treatment, as have doors and windows which open in the center.

In the casement which opens in, for example, a brass triangle is provided with "weep holes" to drain out any water which may accumulate on the sill and follow through into the room. The meeting rail is sealed in a way approximately as in the sliding window.

The sill strip is peculiarly shaped to spring into its sealing power; sometimes it is called a Z-shaped plate, each manufacturer having his own name and pet plan.

Doors

The door sills are made with metal, and metal strips forming a sealed joint against warping, settling air, etc. There is a very nice device used to prevent the cold air let into the bedroom at night from escaping into the halls and cooling them off. On the lower edge of the door is fitted a spring which when the door is closed by contact with the hinged side of the frame releases a felted pad which fits tightly against the sill of the

door. This makes one's winter immersions a pleasure, for the bathroom, if you have one connecting with your room, as well as the hall will be warm for your morning use.

Application

Weather strips can be applied after as well as when the house is built.

"My house is so well built," said a friend of mine, "that it does not need weather stripping." If that could have been so, it was a unique house. There is hardly a house where the wood around the doors and the windows does not warp or shrink or do something equally obnoxious. Whether seasoned by long processes of actual weathering or rapidly kiln dried, wood in captivity becomes restless, and seems to strain and struggle in its fury. Nothing can be said against the builder—it is the nature of wood. The builder is always glad to install the strips because then the owner does not get a chance to feel antagonistic on account of recalcitrant windows, difficult heating, etc., and is therefore relieved from grumbling.

The weather strip must be put on by the experts from the manufacturers of the brand of weather strips that you buy. *Do not call in your favorite carpenter or plumber, for he cannot do it right.* The putting on of weather strips is a science in itself. They must be put on so as to insure a uniform efficiency during the inevitable warpings, shrinkings and swellings of the window. The windows have to be conditioned carefully because the stripping must be so fixed that it cannot be removed, if necessary to do anything to the window itself afterwards, such as fitting new pulley cords, etc. Every window and door offers different problems, so an expert must apply the strips to your window and door. This

is not a commodity that a baby can affix—it's a man sized job.

Purchasing

Remember the weather stripping that you buy should last as long as the life of your house. For this reason the all metal kind is the best to buy. The metal and cloth are efficient as long as they last, and so are other combinations; but they do not last long enough. You must get a longevity insurance. They must be made of non-rusting, non-corroding materials such as bronze, copper, zinc or brass manufactured to a high degree of dependability, and subjected to the most rigid inspection and tests for accuracy, thereby awarding the buyer a rich guarantee.

Find out from users of the brand you think you will buy, before you buy, and see what they say and what their experience has been.

Weather strips can be put on any opening, and should the purveyor you speak to say this or that opening cannot be properly stripped, that is your cue for seeking elsewhere. Buy only from established makers, who will be in business for years—because in twenty or thirty years you might want a window adjusted.

Early in this article mention was made of the saving in fuel by Uncle Sam. Professor Allen, of the Research Laboratory of The American Society of Heating and Ventilating Engineers, in a letter to the writer said:

"Roughly with ordinary good house conditions we can say that the air in a room changes every hour due to leakage around windows. With good weather strips you reduce the leakage very considerably. Of course, this depends upon the type of construction in the house. Some years ago I installed a complete system of weather

stripping in an entire institution and we roughly estimated that the saving of fuel was about 15%." Since then other tests have been made to bring the percentage of saving of fuel from 15% to 40%.

When you think that a window shade keeps in 19.2% of warm air, think what the fitted metal and interlocking strips can do.

The weather strip not only keeps the cold air out but actually by not admitting the cold air allows the heated air inside to maintain the moisture necessary for comfort. With the admission of cold air the moisture is precipitated from the air and we have not got the proper humidity necessary to be happy. The moisture in the home comes from water evaporation in kitchen lavatories, air itself which comes in, etc.

The warm air can carry the humidity, but the cold air does not do it as well, and when it strikes the warm air the latter is forced to condense.

Comfort is the main thing in the home, even more sometimes than saving fuel bills.

"Comfort," says Professor Allen in an address, "is the prime consideration, more than maintaining a definite temperature. Getting the temperature right brings comfort. We should aim at 40% to 50% of moisture in the winter with 68 to 70 degrees."

The fact is that the heating engineer to-day allows for about ⅓ more heating area when the house is not weather stripped. And then, sad to relate, at this consequent extra expense the house will be probably unevenly heated, because some rooms will have big window and door leaks and other rooms little leaks, so there will be overheating in some rooms and underheating in others.

Another engineer said, "I have caught snow in my

hand at a distance of two feet from a tightly locked window in a house supposed to have better than ordinary construction.

"What . . . can better this condition? Weather strips, metal weather strips. . . ."

He also said in the same address on heating the home that the builder did all he could do, with the materials he had. So there is the dilemma!

The storm window can often be obviated by weather strips. The storm window is much more of a nuisance than the appliquéd weather strips. Who wants to add another set of windows to be cleaned? And who enjoys the manipulation of them in rush moments of storm and wind?

For Wind, Dust and Noise

The weather strip is the solution of the gale exposed home, of the noise, dust and weather exposed home, of any home with windows at all. It is not subject to depreciation but increases in value, and as the house depreciates the weather stripping takes on the burdens of the ever increasing depreciation and prevents any more rapid fuel consumption, keeps down the dust infiltrations and lessens the cleaning bills. If, by chance, the woodwork is still obstreperous the defect can always be corrected, if a good brand of stripping has been used.

In other words, weather strips are a good investment. Good weather strips, like any good material, are a good investment.

Much of our trouble with the heat in our homes comes from the impossibility of even heating. Do what he will, the furnace man cannot seem to heat the house. Often you say: "Why do you burn so much coal and

give us so little heat?'' There may be other causes, but the lack of weather stripping is very prone to be one.

Quiet and Cleanliness

The charm of the house is quiet. Don't you unconsciously gage the dignity of the homes that you visit by the quiet of them?

The weather strip keeps much of the street noises out. It dulls and reduces the raucousness of the clang and clatter.

Every housewife knows that the hangings next to the windows get very dirty. She also knows that the room gets full of dust whether the windows are closed or not. A certain amount of dust will get into the room no matter what precautions are taken, but there will be less of it when weather stripping is applied to the windows. This is a consideration worthy of notice, as the servant problem to-day makes all effort in the home more arduous and the less cleaning there is to be done the better for all concerned.

Weather strips are not a luxury. They save money and give comfort by maintaining an equal temperature and humidity, and by permitting more quiet, less drafts and a minimum of dust. Finally, the weather strip is a good investment and, although not intrinsically a thing of beauty, is a thing of duty and lasts forever.

But remember weather strips are easy to make—cheap ones. There are many mushroomic dealers—born to-day and dead to-morrow. Beware of them and buy the best.

CHAPTER XXXIV

BEAUTY AND THE BATH

PROBABLY no development of the home has mirrored human accomplishment to such an extent as has the bathroom. We have prided ourselves on our sanitary bathrooms; on the devices for comfort and idyllic perfection in this, the smallest, yet the most important room in the home. We have developed it to such a point that in new homes everyone has a bathroom to himself with comfortable additions to fit the individual whim.

For a few decades this room has been a replica of hospital efficiency and that has sufficed. But to-day, the artist in home-making is bringing the bath room back to the luxury and ease seen in the boudoirs of ancient days, the days from which we take our beautiful drawing rooms, chambers and general schemes of decoration.

This reversion toward bathroom luxury has come about because the ordinary bathroom has been too cold. It lacked warmth, well-being and coziness. Then, too, bathrooms are always the smallest rooms in the home, and for that reason can be more easily dressed in glorious sheen and kept in harmony with the color scheme and general plan of the home.

A French Bath

A few years ago no one would have thought of having wood panels in the bathroom—we proudly felt that

we had gone beyond that stage. Yet to-day in the elaborate combined dressing-bathrooms we find white wood panels giving a feeling of warmth, together with almost as rich an effect as when marble itself is used.

The French bathroom in one great house is as carefully designed as any room in the house, even more so, for there both utility and beauty are achieved together. Take, for example, the closet seat which looks like a comfortable chair with cane back and seat. The seat of course, is hinged to raise up and down. Here an ugly necessity is beautifully camouflaged to fit in with the entire scheme of the dressing room, and it gives no jar to the inhabitant who must, forsooth, spend many hours of careful toilet making in this superb room. The fixtures here are gold of lovely design, the woodwork in keeping. The floor is of large tile and spread with rugs to add warmth and the room is lit, not only by the regular bathroom fixtures, but also by a crystal center chandelier.

Some bathrooms even have a corner for the bathtub which transforms it into a chaise longue.

In modern bathrooms in luxurious homes we have a reincarnation of the art of Benvenuto Cellini in the gold wrought metal work. This is made to harmonize with the general style of the room in which it is placed, and, though expensive, it is easy to take care of. Besides, when you are really making a bathroom, what does it matter if it goes into the thousands when other rooms go into tens of thousands?

Usually only one or two bathrooms—the master's and the mistress's—reach this height of gorgeousness. The others, however, conform pretty well to the highly convenient and thoroughly delightful rooms in the rest of the house.

The Equipment

An interesting development, too, is the shape of the bathroom—the departure from the rectangular. Sometimes it is octagonal, with a radiating tiled floor and the various functioning fixtures in the far sectors. One room which we have investigated has in one corner a sunken marble tub and in the center the radiator. The gold work in this room is beautiful, but practical, of a design that takes plumbing into the arts.

The thoroughly equipped woman's bathroom must have the usual tub, showers, lavatory, watercloset seat, a closet or two in the walls, a table, towel rack, brackets for soap and sponge, hooks for hanging things, scales, rugs, a chair or stool, toilet paper receptacle, mirrors and tiling for floors and wall.

In the men's bathrooms is added the bidet sometimes a shaving chair and other shaving necessities such as a special lamp for fine work. To both these rooms can be added various things, more or less necessary according to different people's taste, such as the sitz bath, which is luxurious for bathing the feet after a hard walk or a game of golf.

This article in no way intends to be a plumbing article. All it means to do is tell you what there is new in the development of the bathroom and leave the choice to you. See Chapter XV on plumbing where we have taken up the necessities of plumbing fixtures. All you need to remember here is to buy your fixtures at the best possible shop and then get the best plumber obtainable to install them. The installation of all good plumbing work should be in the beginning, in the plans of the architect, for it is difficult and quite complicated to put in plumbing installation after the house is well advanced. There is nothing quite so important to the

successful builder as the early consideration of pipe requirements. The plumber is equipped with the sanitary code, which, of course, the architect knows too, and any householder can get one to read and digest. However, with a licensed plumber, a good architect and a faithful builder, this is unnecessary.

The Bathtub

The most interesting fixture in the bathroom, to Americans and Britons, at least, is the bathtub. Aside from the kitchen stove, this is the nucleus about which our content is generated.

Civilization has been kind enough to leave us two generally used types of bathtubs—the solid porcelain and the enamel over iron (enamel lined or porcelain over iron) tub. The tin tub has gone out, the glass tub is too perilous, and the porcelain or porcelain lined proves about the most satisfactory when we can't have marble or old Italian basins for our bathing.

Recent advances in methods of manufacture and design have made the choice between solid porcelain or enamel iron baths a matter of personal liking as influenced by their fitness for positions assigned to them in a room. On account of the losses sustained for the manufacture of clay products, selected grades of porcelain baths are of necessity higher in cost than the porcelain lined or enameled iron. The porcelain bath is fine in appearance, but it is not reasonable to expect the same perfection in shape and uniformity of glaze. This is due to the difference in methods of manufacture, and allowance should be made for the irregularities occasioned by the baking of glazed clay products. In the past when English porcelain baths were being imported it was perhaps considered distinction to have a solid porcelain bath. With the present extensive manufac-

ture of these products in this country, this condition has, of course, changed. The porcelain lined bath is preferred by some on account of its requiring less hot water to hold the desired temperature. Against this is the fact that cheap porcelain lined baths should be avoided.

There are some points in favor of the enameled tub. It doesn't absorb so much heat from the water; hence a hot bath can be obtained in it more quickly. It is lighter in weight, therefore more easy to install in frame houses and its plumbing is easier to handle. Furthermore, greater uniformity can be had in its construction.

In the tub which is built into the wall, there is a tendency to neglect proper piping conditions. When installing a solid tub, it is necessary to build a bulkhead in back of the tub so as to take care of the waste pipe which should be available to the plumber as it often needs a new washer. Or it must be built against a closet wall so that the pipes are easy to get at, or against a hall wall or some stable place.

Valves

There are myriads of styles of faucets, vents and outlets used to-day in tubs.

It was at first thought advisable to have the inlet as near the floor of the tub as possible in order to make the pour of the water practically soundless after the first inch or two came in. This is about the only advantage of this arrangement. It is far better to have the inlet higher up, either on top of the wall of the tub, or even in the wall above the tub. If it is in the wall of the room it is impossible to hit your back while bathing; and you may have a shampoo nozzle attached; or draw water from it whether you are in the tub or not, and when necessary, fill a pail or dish. There is more noise when the water is running into the tub, but what of it? If you

have a good door on your room, that will silence the sound.

With the low inlet, there is a remote danger of drawing in through the pipe dirty water from the apartment above if some one is bathing in the tub which is a twin to yours. It is quite possible for this to happen unless the plumbing system is very well contrived.

You can have a hot water and a cold water faucet or one faucet from which both hot and cold come. This is a matter of taste. More often there are two, but many people like one, so that there can be a mixture of water, giving a comfortable temperature.

Tubs, of necessity, have to be placed in many ways. When in recesses or in a corner, the valves, etc. can be placed at one end. When against a wall, the piping can be placed above the bath in the wall. This method often lends a luxurious air to a room and has been utilized in the most elaborate ones.

The Shower Bath

Nearly every modern bath has a shower of some description.

The difficulty with the shower is the splashiness of it. The first protective device was a cloth on a bracket. This is still used to a great extent, but the ideal arrangement is to have the shower in a closet designed for it, opening into the room. This closet may be of glass, marble, or tile, with a cloth curtain or a door to match the material of which the section is built. The door should be as small as possible. Twenty inches is quite large enough. The smaller the opening, the less chance for the escape of water. Besides, a large door is a nuisance to clean.

When the compartment is used there can be, besides the ordinary head bath, a needle bath. This may con-

sist of from eight to twelve nozzles pointing in from the four corners of the compartment, or it may be a series of apertures in metal pipes hung around the inside of the compartment. When the separate compartment for the shower is not desired, you may find a substitute for the sheet in the arrangement seen in the Warburg bathroom—plate glass leaves. The glass sheets are practical and not cumbersome. Nevertheless, they involve more cleaning, and in the average home this must be considered to-day.

Mixing the Water

There are various propositions on the market to mix the water in the shower so that it can not scald the bather. One manufacturer offers a little toe pipe, with which to test the temperature of the water before starting the bath. These things are more or less desirable and dependable but are not at all necessary.

It is best to have the valves at the entrance as you walk into the shower, so that your arm may not be under the flow when it begins. If the piping is well done and the valves work, the mixture of hot and cold water can be tempered sufficiently to be safe and comfortable. Here, as well as in every other department of purchasing, you are told a lot of things, and if inexperienced, you may be horribly taken in, and led to buy a lot of unnecessary things, which though good in themselves, are quite dispensable.

The shower bath compartment must, of course, be large enough to permit the bather to stand inside without having to be all the time under the shower. This is an important point. Glass doors are not necessary either for a tiled or for a marble compartment. A light weight curtain is good, with the smallest possible entrance. This obviates the cleaning of the door.

Tiled floors and floors of honed marble are better for shower receptors than are the porcelain ones. They fit into the building problem better, can be made in any size and are less slippery. Be very careful in selecting the plumber who puts in your shower, because unless the drain and curb are absolutely right you will be exposed to the danger of flooding the room and the partitions of the house.

Lavatories and Tables

The styles of these are legion. The sizes are so well standardized that unless one wants them made according to some bizarre pattern it is not necessary to give dimensions. The usual length is about 33″. This is ample and graceful. The 54″ takes more space than most bathrooms can give up to the lavatory, and makes quite unnecessary bulk. The 33″ lavatory—and any smaller size—can be made of vitrified china, which is handsomer and less absorbent than the solid porcelain lavatory. The vitrified china is fired, and therefore it is difficult to make in large pieces.

Lavatories may be made for corners, or straight walls. They may have two legs, or a center pedestal or four legs, or they may be simply hung on brackets. Two legs, however, is the usual style, although four makes a very luxurious looking table. The legs can be had in nickel, glass, brass or in the handsomest types of gold, with carving or some other kind of design.

There has been a reversion, too, in the lavatory. The new style is to make them of imported marble, cut in one piece. With these the gold leg is suitable, also glass which looks well and is most satisfactory, and is easy to clean. Soft American marble is absorptive and stains easily, so when you use marble, get the imported if possible. Another point should be noted in buying the

lavatory,—have enough space on it so that it can hold a glass; otherwise extra cost will accrue from breakage and ruined nerves.

In addition to the lavatory, as we have said, is the bidet, and the dressing table. The latter is sometimes made of glass on gold, nickel or brass standards, but it is oftener made of vitrified porcelain on four legs.

These regal appointments are given to show how some people live.

Faucets

The faucets on tubs, lavatories, bidet, shower, etc., require a great deal of care, since they must be cleaned so often. Various materials have been used, such as cut glass, porcelain and nickel, porcelain-like enamel, brass, silver, gold, etc. For a very rich room, gold and cut glass, or the gold alone is beautiful. But for most rooms the porcelain and nickel faucets are the very best and demand the least care. All-white enamel is not durable and is hard to take care of properly.

It is very much better to have one faucet through which both hot and cold water can flow. The faucet should have an overhang of at least 1″ from the side of the lavatory, so that it will be possible to get a glass under it for filling or your hand under for washing, thus obviating the necessity of filling a basin every time you want to rinse your hands. There are fancy faucets which do not meet these requirements, but avoid them.

Faucets which only flow when held are a curse and should only be used in public places where the water tax is high.

What you must look out for in the floor tile is that it be as little slippery as possible. Therefore do not get a glazed tile. More and more floors are being tiled in colors, to match the home scheme. Also, the dull tile

obviates the squeak occasioned by the shoes touching it. This is a minor point, but one worthy of notice.

Walls can be tiled to any height desired. In the average room the tile is carried only 4′ 6″ up except at the point where the shower is installed. There it should be carried up 7′.

The Closet

The syphon type is, of course, the best obtainable. Many closets are sold especially from catalog and by mail, as absolutely silent. Never, if you can help it, buy anything of this sort from a photograph. No closet can be absolutely silent. If there is any flow at all, complete silence would be impossible. A minimum of noise is the best that can be achieved, and the best makers have closets of this sort.

The bowls are generally of porcelain, and the best ones are of vitrified china (really porcelain), which is non-absorbent and quite the thing for this use because of the freedom from discoloration.

For general use, the less wood around the seat, the better.

The tank as a flushing medium is still about the best thing to use. There are on the market various flush valve types, some of which operate with a foot button on the floor or with a hand lever on the right side of the closet. These may be good in some locations, but neither the ordinary plumber nor the man in the house can repair them in an emergency. The piping in the valve type of flusher requires careful arrangement to avoid trouble.

Sometimes it is rather convenient to have the closet in a doored recess opening into the room and available from the hall as well. This is especially to the point when there are few bathrooms in the house.

Incidental Fittings

Chairs and stools are usually in white enamel or in fancy rooms are made to match the general style which prevails in the decoration.

The question of closets in the bathroom is entirely dependent upon individual taste. You can have the wall and mirror finished type, or the long door regular closet, or a combination of these, with or without full length mirror. In some rooms a glass shelved linen closet is found to be a real convenience.

The soap racks, etc., have lately become recessed in walls. This system is not popular, however, because, although useful and economical for hotel or institutional use, it adds no charm to the fine bathroom. Rather, it detracts from its dignity.

A nice way to have scales in a bathroom is to have the dial encased in the wall, and the tray on which one stands, sunk into the floor. This arrangement economizes space and is very welcome to fastidious people.

Plan the bathroom of your house early. Talk with your architect. Insist upon the best and get it. Your bathroom need consist of very few things, in the last analysis, and the wisest plan is to get the best. The cost will be from $250 upwards, for fixtures. However, it is wisest to buy the best you can afford so that a replacement cost is obviated. There must be no skimping of plumbing work, because that would be a menace to both health and wealth, and the plumbing costs no more for good material than for bad.

CHAPTER XXXV

THE WINTER OF YOUR CONTENT

HOT or tempered air is the theme—how the air in our rooms is kept pleasant in cold weather and not too hot— this is the duty of the heating plant.

Furthermore, beyond the duty of the heating plant, it has been the great civilizing influence in the life of man. Wherever the heating plant has gone, there has man been able to regulate his work, play and goings and comings. In this way health has been better maintained and more regularly in work, therefore, continuous endeavor which, of course, spells advance and civilization.

Not wishing to deprive heating engineers of their profession we shall not drag you through tortuous technical pipes and valves, but simply tell you what you must demand in a heating installation. — Here, unless you are properly equipped you will add to the junk pile in quantity and therefore waste your money by the wholesale.

First: you must decide whether you really want *hot air* or furnace heating. In this case the furnace heats the air and it rises through a register in the floor or wall of your room. According to J. Byers Holbrook, the distinguished heating engineer, this sort of heating tarnishes your silver, your bookbindings crack and your lungs are made either immune to poison or function in spite of the "rich air" reaching them.

In this place it is wise to mention the pipeless heating system which is hot air sent from the furnace to one

central vent or register which is supposed to heat the whole house. It can be used only for small houses. It is very cheap in comparison to other systems, but it is unsafe. (See the safer method further along in this chapter under "Bungalows.") It is unsafe; for example: If there be illness in one room it has to be open to be heated therefore disease will be spread. Furthermore rooms that are closed will get no heat, as the door must be open to receive the hot air.

Second: there is steam heat. This is an excellent system well adapted to residences and buildings, hotels, institutions, business houses, etc.

Third: Vacuum and Vapor, the steam circulates through the system at practically atmospheric or greatly reduced pressure. Vapor heating is used in residences, vacuum heating is used mostly in large buildings.

Fourth: Hot Water, which is probably best for your purposes. And with these deterring and encouraging words we will launch directly into what you should know before installing a hot water heating plant.

The Heating Engineer

There is such an "animal" as the heating engineer. He it is who can tell you to an iota how much heating surface you have in your home to be heated. He it is who can subtract and add footage and finally tell you whether you must heat 4400 feet or 3000 feet. When you know this, of course, you can more readily order the boiler which is best adapted to heat such a surface.

For example, suppose you had a conservatory in one end of a large room—your heating engineer could tell you—due to the glass surface—how much more heat was required for this room, even had you no flowers for your conservatory. Glass windows in a shop or in any room add to the heat units required.

Computing heating area is not easy—because the shapes of rooms, kinds and varieties and areas of walls and door openings come into the problem, to say naught of the badly fitted windows and doors permitting draughts, etc. So you see the heating and ventilating engineer has a job that the amateur or even the steam fitter knows not of. (See Chapter XXXIII).

Usually the householder isn't asked about her heating plant at all. The contracter, architect and builder fix it all up. But—we don't hold with this. You have to live with your heating plant, they do not—and it's pretty much on your head that discomfort falls. Were we building we would be quite intimate with the heating end of life, in fact take a heated and intensely feverish interest in it. Therefore, after your plans, etc. are hatched, call on a heating engineer for a few suggestions, and then go to your contractor and see from whom he is to buy your boiler and what type. Then tell him you require certain things in your boiler which we have listed "here below" for your winter of content.

Principal of Heating

Steam heat is, of course, heating by means of circulating steam through pipes to radiators. This is affected by a one pipe system sometimes, or a two pipe. The steam ascending from the boiler in one pipe and condensing into water falls back into boiler in same pipe. In the two system arrangement the steam ascends in one and returns in the other. The one pipe system, of course, is cheaper but takes skill in setting, as the pitch of it (the angle) must be perfection. In the radiators the steam condenses and returns in separate pipes in the two pipe system.

Hot water heating is the circulation of hot water through pipes to radiators. The heated water being

lighter rises and as it cools in giving off kind heat to you, it falls back again into the boiler where it is again heated and takes another "rise" and so it circulates through its system. Therefore, in all heating systems there are two main divisions: the generation part of boiler and the circulation part of piping throughout the house. Both parts must be perfect to insure perfection of heating. The first part dependent on many factors, the second on a few more. In the hot water system an expansion tank is always placed at the top of the house in order that the overflow can be taken care of.

Boiler Purchase

1. Swiftly speaking—the boiler must make every pound of coal do its best, it should respond rapidly to climatic changes, it must be easily fueled, shaken, regulated, cleaned, free from repairs, rust, leaks water heat or gas and it must be easily set up in room for its use. (All good boiler makers send you "coal information.")

   Economy in fuel and labor.

   Save coal yes? But economy in coal means getting out of every pound the maximum. So when you buy coal ask what its fuel value is? It ought to be about 12,500 to 14,500 B. T. U.—that is, it takes to raise 100 pounds of water 1 degree Fahrenheit, 100 British Thermal units of heat. B. T. U. is the way to measure heat units as 7 yards of satin is the way you measure goods for a dress. The best type of boiler for the home is the sectional, cast-iron type. In this the water is run through tubes and presents a large number of surfaces of water to the heat.

   You must demand a boiler amply large and of the best type of tubular—where heating is most rapid, and direct in order to save fuel, in order too, that all the

heat generated goes to heating the house, not in warming the flue or chimney.

2. Fuel portion. These must be *deep* to insure enough coal at least for 8 hours of heat. So that in the morning your house will be warm and some coal left in to be joined in lawful heating to the next supply —leaving no interim of coolness which wastes the coal and supplies pneumonia. It takes more coal to reheat completely than to add heat to a heated mass of coal.
3. Boiler capacity. Find out how your boiler is rated. If its capacity only assures you 6 hours of heating; you must not expect it to do 8 or 10. Only in the best —the very best makes, do the ratings have much weight. Experience counts. You can tell approximately. But buy the boiler you don't have to force. For forcing a boiler adds to your coal bill. Your boiler capacity must be a little *beyond* what you actually need. 70 degrees in zero weather is the standard. A strong "Coal-ition" government is here necessary!
4. Rapid water heating essential.—
Water-ways thin enough to heat water rapidly. Quality and position of heating surface must not allow for waste of heat. 65% of heating surface should be in direct contact with heat, 35% in flue surface. Response to your dampers will show you if you have 65% of your heating surface in direct contact with flame! Go and see the best hot water boiler in your vicinity—before you buy consult your engineer and ask about others.
5. Operating must be easy "as pie." Grates should be easily pivoted and balanced. Arrangement must prevent all accidental dumpings of fuel in fire pot. Coal so used as to not disappear through grate. One

lighter rises and as it cools in giving off kind heat to you, it falls back again into the boiler where it is again heated and takes another "rise" and so it circulates through its system. Therefore, in all heating systems there are two main divisions: the generation part of boiler and the circulation part of piping throughout the house. Both parts must be perfect to insure perfection of heating. The first part dependent on many factors, the second on a few more. In the hot water system an expansion tank is always placed at the top of the house in order that the overflow can be taken care of.

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boiler employs a damper rod running to the front which enables the caretaker to open and close the smoke damper rapidly when building and this prevents gas and smoke leakage when door is open. Such a device as this makes a floor room in a cellar feasible. The boilers of some companies are so beautifully contrived and finished that they are no worse than a talking machine or upright piano in a play room. In fact better looking!

Feed doors should be wide mouthed enough to put in easily the various "meal time" supplies.

The ash pits must be big enough to hold ashes away from the grates.

6. Sectional construction desirable.—
These sections make it possible to enlarge a boiler; (2) to move it into a house built completely without tearing down the house, and obviates its sitting around in a house which is being built, a prey to all sorts of bad treatment; (3) can be taken through any cellar door; (4) can easily be taken apart.

7. Must be easily cleaned.—
All surfaces must be available, fire and flue parts largely self cleaning. The surfaces can be so made that soot peels off. Flat surfaces must be easily reached for quick cleaning, ¼ inch soot deposit will demand 50% more coal. So get an easily cleaned boiler or no one will clean it at all!

Boilers should have conveniently placed doors into which cleaners can have access. If cleaning is easy it will be done, otherwise it will not. We made this point too, with refrigerators, etc.

8. All connections must be water tight, steam tight, gas tight. There should be no packed or gasket joints made of rubber, asbestos, paper or other washers in

connecting joints, etc. This is very important. Repacking should never be necessary with *your* boiler—the longer it is used the tighter the sections, etc., and yet they are easily taken apart at any moment. The nipples or valves must be easily closed and everlastingly tight, yet easily opened.

9. The steam boiler for steam heat; the water boiler for water heating. No straddlers must be used.

10. The best boiler is of cast-iron. It will outlast the building; will not rust or pit. It is so built as never to need repair and it doesn 't ever seem to wear out.

This is an investment—other kinds of boilers are finally permitted to add a value to the junk pile by rusting, pitting, and other useless decadences.

11. No danger in a boiler where the fire chamber is entirely surrounded by water and steam surfaces; and when the boiler stands low and therefore well away from the joists and woodwork. Boilers are generally tested for 80 pounds pressure, but to operate them 2 pounds ought to be enough, though 1 to 5 is the usual bill-of-fare.

Steam boilers should have a relief valve—when pressure builds up to 10 or 11 pounds.

12. Should be few outside fixings—should be able to be installed without digging a pit. This, by the way. would be a good way of starting your chat with the regal contracter, "I want a simple, fine boiler, for which no pits must be dug, or brick enclosures." The best boilers only require a brick base, for obvious reasons. There should be no alterations of building necessary, because the sectional boiler like the sectional bookcase is made to fit in anywhere. Asbestos covering of boiler often prevents waste of heat in the cellar.

13. Thermostatic valves come with some boilers to cut off automatically and "set on" heat. This conserves fuel. (See section on heat control.)

Piping

The piping from boilers to radiators has to be done carefully. The best steam fitter is none too good. The grade or pitch of the pipes etc., the area of surface, the diameter *et al* must be adapted to area to be heated and to the system employed—all of course, is too technical for your needs here. Only you must require care to be used here and let your contractor know you're "on."

The Gas Boiler

In this boiler you get maximum comfort and maximum heat. No coal, no ashes, no bother, little cash. But this must be from the best makers. It is usually more costly to operate—but—!

Water Backs

Boiler makers in outstanding manufacturers make excellent water heaters in which water for laundry etc. is heated by heat which would otherwise be unused.

Radiators

Radiators are the translators! They are like the English writers who translate the Russian novel. The radiator alone tells us whether our hot water in the boiler is being translated into heat for our comfort.

They are either curses or benefits! But they are usually the eye-sore of the home.

In short they are a series of tubing which present

a maximum of heat radiator surface. They have valves, for controlling the heat.

If you buy the right valves, your radiators will not leak, water-hammer or bang, or flood.

An air valve must let out the *air* to permit the steam or water to fill the pipes. If it doesn't do this, it is of no use. Varying steam pressure, flooded radiators, forced firing of boiler (which you must avoid by having a boiler with large enough capacity) are overcome with correct valves. The right valve saves fuel, because unnecessary amount of pressure is not needed to force out air, the right valve copes with dirt and dust, prevents floods, requires no adjustment. Air and steam units cannot mix, the valve releases the air. The valves must be all metal five years guarantee, and no adjustment necessary.

The radiator which is recessed in the wall has the advantage of being less visible, but unless you employ heat reflectors you will lose a lot of heat—and even with them you lose some.

Some manufacturers are doing their super-level best to build radiators which are lovely to the eye. But, again like the upright piano, they can be made but comparatively beautiful. Gratings can veil them but are gratings lovely? Then too, there is a loss of heat.

One radiator company has good-looking radiators which are very successful. Their series of columns make them able to resist high internal pressure. The internal area of the tubes in relation to the heating surface has been reduced to ¼ of that run in general use. This not only greatly increases the pressure resistance but in reducing the internal area, the water or steam contents are likewise reduced.

There is on the market a covering for radiators which is very satisfactory.

There is more heating surface in this type too.

The water content is ½ the content of other radiators. This means quick and positive venting for steam, vapor, or hot water installations and provides rapid circulation, causes radiator to heat up more rapidly.

Air Vent (Steam heating)

The air vent on each main, allows the air to escape so that the heat arrives more rapidly to radiator. This of course, saves fuel.

Heat Controls

To take the heating of your home out of the area of dreams and out of the expensive realm of "feeling," some sort of heat regulating device is recommended. It is foolish to say "Do you think it is warm enough?" to a group in the room. For no two will think alike!

Apart from this, the perfect thermostat not only tells you at what temperature is your house, not only keeps the house evenly heated, but in doing this saves you fuel, expense, illness and what not.

By simple mechanical means the thermostat opens and closes the door of the furnace as the heat needs to be lowered or increased. In this way if less heat is required, the door closes, and less coal is used etc.

Thereby another simple yet ingenius device. The thermostat can be set to do these things at any *time* you wish it to be done. If you want the damper opened at 7 A. M., so it will be done—and you don't need to go in your pajamas boiler-ward!

There are two or three excellent thermostats on the market and many not so good. Be sure you consult before investing. The best thermostats have no corrod-

ing, or wearing parts, look well and prove themselves thoroughbreds.

The thermostat prevents cooling off of the boiler which means starting a fire over again—which means wasted fuel. All means must be taken against such waste. Much coal is lost in uneven combustion, some coal being entirely wasted. The thermostat prevents this, by ordering a steady, definite consumption of coal.

It takes far less coal to heat hot or tempered return water than to heat cold—the thermostat prevents the cooling down entirely.

The Bungalow Owner

There is now on the market a hot water boiler which is compact and good-looking which if put into a cellarless house heats it with the efficiency of the subterranean boiler! This is done through pipes and radiators and with a maximum comfort and a minimum care.

Heat's Influence

It is usable in schools, cottages, etc., and bids well to civilize sections of the world which have starved for heat and consequently have been stunted in physical and mental growth. This boiler is the Ford of boilers, giving unto every man the right to be comfortable wherever he lives!

Heating with Oil

Oil heaters for special rooms are made by the principal oilstove makers. These give good results but of course are not comparable to hot water heating, steam etc., plants.

Electric Heating

As yet heating a house by electricity is too expensive and isn't done except by small comforting heaters which heat one room at a time. These are very clean and efficient and not expensive.

Hot Water Heating

The problem of heating water is of serious dimensions for life without hot water to civilized man and woman is a poor struggle.

At present there are on the market, distinct from the usual hot water plant installed in properly built and equipped houses—many different and efficient heaters and boilers.

In houses where there is no hot water central plant there can be bought for moderate rates an electric heater which is attached to the faucet in tub or wash basin or sink and through its system of copper coils over which the water flows through, you can get hot water immediately! This needs be but connected to your electric light circuit—outlet or fixture.

Then there are large circulation water heaters of electrical contriving which of course has to be separately connected—as the (Wattage) heating unit is rated at about 660 watts! These heaters are of excellent construction, but in most vicinities as yet—electricity is too expensive to use thus. This is controlled from any place in the house, so you need not go down in cellar to start a hot water "anything!" In the best of these it is possible to turn on more heat or less from original source by the use of multiple heat switches.

All conductors must be insulated, these heaters should be easily installed. There is possible here hot water without ashes, gas fumes, fire risks—and desired tem-

INCINERATOR

perature at will! It is a fine hurry device for the sometimes opened country house. In winter it is a boon.

Then of course there are the little electric emersion heaters. This is a heating unit which is dropped into the water basin, pitcher, tea-pot or what not and attached to electric light bulb very quickly heats your water.

Gas

The gas heater up to date has been most reliable and efficient.

There are many good gas heaters too on the market, which when you turn on the water start the fire! These are rapid and have given very good results.

There are many "boiler" heated water schemes—the water backs on gas and coal stoves etc. Then too a very efficient method is using the heat (over) not used in the sectional boiler for heating the house. This is effectively used in auxiliary boilers for heating hot water. Some firms are rightly proud of this contrivance as it is inexpensive, ample and convenient.

CHAPTER XXXVI

OUTLETS SAVE YOUR INCOME

LET there be light and there was none—is the verdict of many an estimator who goes over a home after it is built and sees the occupants laboring to read, sew, game or cook according to their separate desires.

And so to take the "bull by the horns" and begin with the practical first—one of the best ways to get proper lighting is to have sufficient outlets for electricity, portable lamps with oil and enumerable fixtures with gas.

This will deal specifically with electric light, yet the general principals will apply to all other lighting.

Lighting

Good lighting can mean good health. Eye strain is often the cause of depleted systems, indigestion and things that lead to other calamaties. Many a doctor would better analyze a home to see what could afflict the sufferer than analyze the patient!

Flickering lights strain the eye, because it cannot adapt itself to the rapid variations in intensity. So the flickering light must go. Lights that are too bright hurt the eye, lights that are dim cause strain, all in turn having disastrous effect on sight and on health—these too must perish.

The best sort of lighting, of course, is the diffused light which without glare is sufficient for reading, etc. Here, though, the distribution may be so imperfect that the glow is dispiriting and consequently a light softener

in the guise of a lamp shade or frosted dulled glass helps the situation.

The indirect lighting system, is popular to-day. When buying this type you must be sure to get them as dust and bug proof as possible. The simpler they are the easier to keep clean, of course.

Money can be saved by having outlets at frequent intervals, so that lamps can be attached at the point needed, rather than having to light many lamps at various ridiculous places in a room as contributory lights.

Fixtures which have lights set obliquely in them are hard on the eyes, lights are not meant to shoot light in your face but to supply aid quickly and politely to the eye. Fixtures should have their globes, in the perpendicular.

Height of Lights

Lights should be high enough only to cast a direct light on the subject in hand. The reading lamp must help the reader, not impede him. Try over and over again until it is placed correctly. The shade should be such that it not only directs and diffuses the light, but softens and subdues and makes it a pleasant thing to the eye.

Very often dim lights can be magnified by a reflector. Never, though, can a reflector actually increase the light, that is to say, the reflector doesn't increase the electric power or size of lamps but simply reflecting more than absorbing, the light gives you its fuller value.

Reflection

You are probably aware that certain colors absorb or reflect in varying degrees. Usually in the papering of rooms no account is taken at all of this perfectly

honest color vagary. Consequently, a dark room is often somberly decked in deep chocolate paper and therefore you get something like 4% reflection whereas in that room white would reflect about 70% and a wall yellow painted would reflect about 62%, thereby saving the necessity of just that much more lighting.

Green reflects about 18%, blue 12%, so you can see here what to do with certain rooms that should be dimmer or brighter.

In the same way shades of globes enhance or detract in reflection capacity..

Clear glass absorbs about 5-12% of light and cobalt blue about 95%, so here you see if you have a lamp absorbing 95% of light—that you will need more lamps than one absorbing but 5%! Think on these things.

Light Measurements

The foot candle is the unit of light measurement. A standard candle has been decided upon and all lighting calculated on this basis. We say we have 16 candle power lamp that it means it gives light of 16 of these standard candles. From a 60 watt lamp the candle power obtained from a tungsten is 56 candle power. A saving in money is had if the tungsten though more expensive is used.

Cost of Light, Electric

The amount of electricity taken by a lamp is measured in watts—

Watts ÷ 1000 equals Kilowatts
Kilowatts × hours equals Kilowatt hours
Kilowatt hours × rate equals cost.

(See Chapter I on Electricity.)

Economy is quite possible here as in burning oil or any thing else. If your lights are well placed, you need less light if they have not too absorbent globes you will also need to use less light, if you have proper wall tints, etc. You often need fewer lamps. One good lamp in the right place saves two or three wrongly placed.

The Tungsten filaments burn brighter and more cheaply than the old filament of carbon. There is a saving of electricity somewhere around 50% in the use of new filament.

The Incandescent Light

That brings us to the story of the incandescent lamp—

Incandescent means to glow with heat— In short the incandescent light is one which employs a globe in which the air has been exhausted and in which a vacuum exists. Before the air has been exhausted a filament of metal has been affixed through which the current of electricity is passed. In the resistance of this current the filament glows and gives the light that you use.

Don't take any lamp you can get. Ask for the number of candle power or watts you want. The lamps to-day are more popularly sold according to watts rather than candle power.

Indirect and Direct Lighting

Of course there is a loss every time the light is reflected through a diffusing medium. In correct direct lighting most of the light is only reflected once before using point. In indirect lighting it has one more reflection (at ceiling) causing a loss hardly much less than 25% and maybe more. The diffusing bowls throw a large part of the light—in semi-direct lighting—where there is a similar loss and the part of the light which goes

through the bowl is considerably reduced by absorption. Naturally direct lighting is most efficient. Yet lighting is a matter of diffusion of light and often the indirect system gives not only more joy but better illumination with no greater consumption of power than direct lighting.

Avoid shallow reflectors not covering filament (or mantle in gas lamps).

The plain electric glass shades through which the source of light is plainly seen are practically nil. They absorb more light than a good reflector and do no good—unless to look a wee bit better than a bare lamp. Ground glass is a better thing but poor enough.

Colored shades do absorb light but they are decorative—a combination of white reflectors and colored shades is often a good trick.

Special Room Service

In lighting rooms remember their special needs. It is very unpleasant to have a light unshielded by a shade of some sort as the eye rebels against the sharp concentration of light.

Dining Room Domes

Dining room domes are like mountains of flowers—obstruct the view and make you hurdle to see a diner opposite to you. They should be hung high enough not to become obstructive to the view and low enough not to throw light in your eyes. If this can't be done, hang it high rather than low and cover the opening of the dome with a material somewhat alike in color to the dome.

The Bedroom

Have your fixtures on the side walls and plenty of them. Yet in some bedrooms, there are often three lights used when one properly placed would be enough! Think of the money outlay! A few outlets in convenient places will make it easy to use the vibrator, electric pad, shaving stand etc.

The Kitchen and Closets

Over the sink if necessary a small light can be placed. All dark closets should have an electric light; which can be switched on from the outside of the closet. It is a real sanitary measure to say nothing else of the ancient blind groping in a dark cupboard for these things —which roll and break in the groping! Blind sport —Electric lights in all closets are not luxuries now they are nervous prostration preventives! Light is a detective. Nothing bad can survive in the light! Dirt is revealed, bad conditions laid bare—hence the light works for good! Closets need light, shelves as well need light to visualize little corner lurkings!

A good light in the vestibule is often a perfect chaperon for youth!

The shaving mug and stand need careful lighting to prevent discomfort and inadvertent cuts.

The cellar can be a lonesome spot if not properly lighted. No one will clean it. A switch upstairs to light the cellar before going below, with enough other lights will do much to "sell" the cellar as a usable, cleanable room.

Flexible lights for desks are great comforts. There are countless decorative as well as practical desk lamps on the market to-day.

Although the primary object of lighting is to light, yet the market to-day has any number of fixtures which seem primarily for artistic purposes. And we must say that the fixture makers have a long way to go yet in the sheer beauty field—as have most non-custom made products.

Architects

Don't leave your lighting to your architects. Illuminating enginers are good but you can even be more illuminating by knowing your own needs and habits.

There is no excuse with electricity in not having your lights where you want them. Buy the right lights to save your health and eyes.

Talk to your contracter before the house is "let" for building. Here is the time to talk outlets!

In Finale

1. Clean globes mean more light. Don't think you don't have to clean electric lights. You waste money on electricity with every grain of dust on your globes.
2. Tired eyes often mean too few lights or light placed in wrong places.
3. Remember don't always blame cook or work for indigestion, it may be your eyes from bad lighting.
4. A bare lamp if it must be used should be above the eye line, always use a shade.
5. Too much is as bad as too little; both strain the eye.
6. In low ceilinged rooms use two or three side small lamps rather than one large one.
7. Remember ask for the size lamp you want, don't just say "I want a lamp."
8. If you don't understand lamps, go to a library and

read or consult a good electrician, or go through some one's home.

9. Standard plugs throughout the whole house so that all connections can be made at any outlet.
10. It is wiser to have more rather than too few outlets.
11. Switches—remember you can have lights so arranged to snap on and off in the closets by a switch on the outside. (1) You can have switches (3 and 4 way switches) that enable you to light the light upstairs from downstairs and turn it off when you get upstairs and turn it on again either up or downstairs. (2) Side wall switches—near doors as you enter; (3) Another switch to turn on all lights in house at once in case of danger.

Some Suggested Novelties

There is a "cute" little thing now to be had to prevent you bumping your shins on a table when leaving the room—a light that when you put it out stays lit one minute after you pull the chain!

Cord Divider

There is also a device which connects the long electric cord so that you can easily lengthen or shorten it without calling in an electrician.

Tinting

Lacquers for globes can be bought whereby you can reduce the glare of the ordinary lamp at will or even color them to suit.

Principles

First principle is that diffusion of light is necessary in order to see the object clearly and pleasantly. (2)

Brightness is to be avoided. No general rule can be given for number of foot candles—different rooms—whether dark or light in decoration—need different treatment. Experiment and experience are the only arbiters here.

Some rules: (1) *Avoid flickering light*—fatigue and nerves result from flickers. (2) *Use shaded lamps.* More diffused light from a large source gives better light than from a small. (3) *Don't judge the light by the lamp.* The lamp doesn't give light. The light which comes directly from the lamp to the eye does no good and may interfere with the useful light which has gone from the lamp to the surrounding objects and thence to the eye.

(4) *Do not face the light.* It is well to have the light from above over the left shoulder. This plan obviates the shining surfaces of paper, table tops etc. from interfering with pleasant seeing. In this way too, you do not see the lamp itself. If you have to shade your book the light is wrong for *you.* (5) *Avoid brilliant reflection* of the lamp. (No matter how brilliant your own reflection may be!) Glossy paper in books especially for children should be "verboten." (6) *Keep lamp away from your work,* your eye likes not to concentrate on concentrated light. The desk light or factory light lying "away" rather than "next to" is far better for worker. A special reading lamp is good but is often pleasanter when used in connection with a soft general lighting. (7) *Vertical light carrying fixtures* are best—old ones can be bent to carry light vertically.

CHAPTER XXXVII

Tin Ware, Rubber and Paper

TIN is one of the oldest metals in the world. The Ancient Greeks and the Ancient Hebrews made mention of it frequently.

Before the advent of the Kingly Aluminum and the Queenly Enamels, agates, granites etc., tin was used extensively in the kitchen, but now the cooking utensil is very rarely tin and rightly so.

However, tin still remains a good thing for various things in the home and is well worth employing in different ways. These ways will interest you to consider.

However—firstly—all things made of tin to-day are but steel or iron dip and coated with tin.

Tin melts at a comparatively low temperature and is besides affected by acids. That is why baking, stewing, etc. are not to be done with tin utensils plus acid food. The dark rings on baked apples cooked in a tin dish show very plainly what acid and tin do in combination.

In buying tin the criterion is its weight. It is only wise to buy tin ware in the best shops, because small, but out of the way hardware shops can rarely afford to keep on hand the best tinware.

It should, of course, adhere closely to the lines of all other utensils in that it must be smoothe without rough globules, without seams, which might catch food or dust particles to create an aftermath condition difficult to rectify.

Cleaning

Put tin to be cleaned in hot soda, never more than 5 minutes because the tin will dissolve somewhat, as the heat and soda meet and though it will disintegrate the grease it will make the iron or steel base show through. But with more fine powder like whiting, rinse hot, and dry while hot. Tin will rust so it is best to dry while "the tin is hot!"

Japan

Among the most useful and jaunty things in tin is the so-called Japan wear which is but painted tin.

Bread and cake boxes in different colors, with and without shelves, sliding doors and in varying fasteners to suit your fancy. These are light and easier to manage than the shiny metallic ones and easier to clean out than the wooden ones.

Cake Cutters

There is no reason either why you cannot use the less expensive tin cake cutters in their multitudinous designs. They are keen cutting and light and very durable.

Galvanized

Galvanized wear—is usually steel heated to a special finish of tin. Some of the things in this material are most useful and necessary—for example, the refrigerator drain pan, garbage pail and ash can. These are extra heavy and withstand wear and jouncing.

For the less elaborate kitchen, the tin muffin pans, funnels and pie plates are useful yet not as good as other kitchen wear such as the Aluminum and Enamels.

Necessities Not Known

The ideal Christmas tree holder which keeps the tree fresh for months on account of its simple reservoir for water is really something well worth knowing about. It holds the tree very steady and is japanned in a dull green.

For country or suburban homes the out-door incinerator, a perforated tinned container, permits the burning of rubbish without danger from blowing cinders; of course, this is not meant to burn fats and animal refuse. An incinerator (see Chapter XIII) of another order is necessary for this.

There is no reason whatever, however, why the copper bottom wash boilers whose numbers and designs are legion should not be used. As they are light in weight and durable.

The galvanized coal scuttle, flour bin—japanned or plain heavy tin, is not a pariah even yet.

If you have the "tin," it is usual for you to buy the better metals. Yet there are quite legitimate uses for tin. There are some householders who have tin ware left over from the past. To those, however, we can say don't let it worry you; as they die out replace them with better, if you care to, but be loyal to what you have used if they have served.

No one recommends tin to-day for cookery when on the market are ideal cooking utensils, but what we do wish to convey to you in this chapter is that tin has very legitimate uses.

For example spice, sugar, coffee etc. canisters in white enamel tin, brown, black etc. with gold lines. These are not as autocratic as the blue and white china but they will outlast any such delightful and much to be desired shelf trousseau. A kitchen in white with

white enameled tin containers is a very pretty thing to contemplate.

Some of the heavier tin ware is iron or steel dipped in tin, this, of course, is very resistant and enduring and not particularly cheap.

Agates, enamels etc. are merely steel and iron covered with layers of composition that when dry are made up to resist cookery onslaught.

Ice-Cream Freezers

There are two or three very interesting and effective ice cream freezers made of tin. There is one in fact so built as to need no turning.

Trays

Tin trays are invaluable as they come in all sizes and are exceedingly light. They come plain, japanned and some decorated—but any one with a sense of paint and form can make an ordinary tin tray a thing of joy—while for the most part the tin ware houses execrably decorate the trays! A word to the wise!

Rubber

The rubber wear that is used in kitchens is not extensive but what is used is indispensable.

For preserving, of course, the rubber ring to tightly close certain jars is a necessity and the best is none too good to buy. Unless you have the best here you are cheated by breakage.

Rubber gloves for kitchenette and kitchen use save and prevent breakage, they also prevent the sink becoming "holey." For "holey" sinks are horrible to contemplate!

Some people like perforated rubber mats on lino-

leum or tiled floors and on kitchen hallways and stairs. These wear for a long time.

A few rubber corks to have on hand in the home often helps you out of a dilemma of temporary corkage.

Rubber brushes for sink use in combination with tin are useful and can be well scoured and kept in condition.

Rubber gloves for kitchenette and kitchen use save the hands and are worth their weight in radium. If more women used them, the house work problem would be less like martyrdom. They preserve the hands, health as well as beauty, in fact could anything be "handier?"

Rubber is used for door steps to preserve the door surface and to prevent noise. It is also used on the tip end of legs of tables and chairs to preserve floors and rugs and to diminish noise.

This is about the full list of rubber things for the house except, perhaps, the rubber heel for maids' and butlers' shoes and rubber stoppers for sinks.

Paper

The uses of paper in the home are not so many.

Shelving in the pantry or kitchen can be kept in renewed health with paper, laces of course.

The bungalow, or motor trip or picnic can be well supplied with paper and fiber plates.

Rather would we warn you against paper uses! such as wrapping up your ice to preserve it, to spoil food, wrapping up your food stuffs in paper in refrigerator, greasing muffin pan with paper for which you should use a brush.

Sometimes, however, a piece of paper will clean off the top of the stove very efficiently, yet even here a brush would be better.

Clean brown paper to absorb French frys (potato) is quite indispensable.

The paper napkin has made its place even in the homes of wealth.

Wax paper is a delight to wrap up sandwiches and keep bread stuffs and cake fresh.

Paper lining for drawers, of course, is necessary.

The pretty paper lace doily for under finger bowls, cake and bread, these are delightfully pretty and save the linen, the laundress and the laundry list.

Chop Papers

Paper "golf stockings" for chop bones, poultry legs etc. are decorative.

Charlotte Russe

Vegetables and charlotte russe are often, too, served in the paper cup.

Which, by the way reminds me that in large kitchens the paper cup is indispensable.

In this place it would be well to say that a pad—a writing pad—should be in every kitchen for multitudinous listings and memos. No kitchen is a perfect one that isn't "padded." In fact it is a sell if it isn't!

CHAPTER XXXVIII

Come Out Of The Parlor

IF I were a cook (of course, being a democrat, I aspire to no such plutocratic eminence, but were I a cook), I should want to have for my use a number of culinary accessories to make life more rosy, more serene and even more delightful than it naturally must be.

If I were even a wife, I should welcome gifts that would make the work I had to do in the kitchen more saving in time, effort and labor.

But being neither of these, and therefore, free to roam through manufactories, laboratories, and shops, I will suggest from the myriads of fascinating kitchen articles and appliances some that will make captivating and useful gifts. When you once have made a present of any of them you will automatically become entablatured in the recipient's memory, and maybe you will be saved the expense of many a meal!

If I were that cook—I would hanker after the ice pick that doesn't slide—the spring pick (25 to 35 cents). You just jab it into the ice and slide the handle up and down, and you waste neither ice, food, nor temper in the process. It is a gem of comfort.

The Small Equipment

The cream bag, with all the alluring little tubes for making fascinating designs on the birthday or Christmas cake, saves the cook time in rigging up paper tubes for spreading cream and sugar.

If it were only to obviate the unpatriotic cry against

our thick bread in comparison to the British gossamer slice, it would ease one's life to have some one of the bread slicers on the American market which cost very little. (About $4.[1])

Nothing saves more energy than the food chopper (from $2 up), the nut-cracker (from $1 up), the cherry stoner (75 cents up). These processes of stoning, chopping and taking out nuts whole are all tedious by hand.

The coffee mill, too, is a pleasure, the kind that has the glass top to keep you cognizant of how much work there is before you. Some of these screw on the wall and are about $1.35 and upwards. The beef press ($1.50 to $5) (See Chapter on electric mixing units) for invalid or baby is also a boon.

The prices of all these things are very low as prices go these days. In some of the realms, however, the prices vary so from day to day that one is afraid to mention them. But, whatever the prices are, the devices are worth the cost in helpfulness and service. And, strange as it may seem, the kitchen denizen, imperial though she be, rarely dowers herself with the time-saving, step-saving apparatus.

Scales and Sharpeners

Kitchen scales, good ones, are really indispensable to the careful housekeeper. The balance type is the most accurate and costs from $8 up. Very often you can test your purchases and if under weight you can scold the grocer (what fun!) and if over weight—but what's the good of dream stuff here? The hanging spring scale is accurate and costs from $2.50 up. (See Chapter XL on Measures.)

[1] All prices here are merely approximate. By the time this book reaches you the prices will be much lower, we hope!

"Oh, for a sharp knife!" A feminine and hopeless cry often . . . but the carburundum knife sharpener (30 to 50 cents) would obviate the humiliation and let the lady cut a big swathe with her menfolk—if they found sharp carving knives set before them. There are many types of sharpeners on the market. Some of them, of course, are quite expensive. Buy the best in this case as in every other case. The best is an investment; less than the best is an expenditure.

Nothing can cut down the antagonism between time and service like vegetable slicers. They slice any vegetable and cost about $2.50 up. Do you realize what such a donation could mean? Could any little fluffy-ruffle pincushion mean so much to anybody, be she cook or pauper?

If you want to give something in the realm of a card for Easter, Christmas or New Year, or some trifle in the case of another sort of anniversary, why not send some of the silencers for kitchen chair and table legs at 10 cents a set? Or the permanent gas lighters for 25 cents. They are convenient and amusing.

Owning a rotary fruit parer ($1.50 up) saves energy and caters to your sense of form, as the fruit can be served unangular and with little waste, and besides, the cook's imperial temper is not stirred.

Table Bells and Griddles

Table bells of sweet tintinabulation save the nerves. At any rate there is poetry in such a gift, and one can spend from $1.50 to any price at all on these romantic things, as they also come in the precious metals.

There may be many domiologists with doubts about cake, bread and mayonnaise mixers, but if you ever gave any of these articles to a household, you would go down into history as a benefactor. I wonder often

why so many of us forget that such gifts are really gold mines.

No one likes to do unnecessary cleaning and scraping of utensils, so the aluminum waffle and griddle are presents of unusual pleasure-giving potentialities. The prices here are prone to fluctuation but there are always sizes to be had around $4.50. The electric ones cost three or four times as much.

If you would give a regal gift to the Monarch of Culinaria, the kitchen cabinet is the thing. It is compact little kitchen "with everything in it but the kitchen stove," and fills the need of the worker in the badly planned and equipped city kitchen and the unplanned kitchen out of town.

Although not exclusively a kitchen gift, the vacuum cleaner connot be excelled as a present. Once bestowed you are looked upon as a fairy god-parent. Why not give one for a wedding present sometime? The fireless cookers and refrigerators would come under this classification too, but they vary in price too much to record here.

Electric Dishwashers and Stoves

If there be a regent and not a cook in your kitchen, she will welcome with tired arms the electric dishwasher, the boon to the woman doing her own work. It costs about $150. or thereabouts and makes housework a game rather than drudgery. Haven't you often heard the young wife say: "I wouldn't mind house work at all if it weren't for the dishwashing."

Then there is the magic—yes, magic—electric stove family! There isn't time enough left to tell of some of their wonder workings. If you gave one of these (costing about $180), you would be giving at the same time money, time-to-herself, and the rest cure. Some

of these stoves automatically cook and stop their cooking while you are out or sleeping, save money because they make cheap cuts of meat taste like expensive cuts, act as fireless cookers and refrigerators and . . . I will leave the rest to your investigation.

Of course, there are the electric laundry appliances, casseroles, ice-cream freezers which must be turned and which must not be turned, convenient egg-heaters, buffers, kitchenette articles, and countless other things in the line of percolators, etc., which are obvious and need no mind-jerking from us.

All these things are gifts of value, tremendous helps to the cook and ought to be boons to the seeker for something to give.

Be elastic! Come out of the parlor and go into the kitchen for a new field of giving.

Gifts raise the value of things and the value of culinary pursuits need raising.

CHAPTER XXXIX

Latest Inventions

THERE may be nothing new under the sun but there is always something inviting under the roofs of our manufactories, in these labor, time and energy sparing days. Not to keep abreast of the news is perhaps to lose at least a week out of your year in time and a few tons of actual effort.

There is an ideal mixer on the market which attacks and synthesizes a mayonnaise, cream or eggs, mixes cakes, makes bread of its ingredients, and all in all can almost be hitched to the stars and change the rotations of the solar system, extravagantly speaking. It is modeled on a giant mixer fomerly used in hotels and soda fountains but now adapted to home use. Furthermore, it is prepared to annihilate meats, nuts and fruits. It is a complete power unit and worked by electricity.

Multum in parvo—here you have it. A little washing machine that can be a sweet pal of the portable typewriter—less its weight, not requiring, though, either ink or hand labor. This tiny wooden washer is placed under a water faucet and the weakest stream of water revolves its little cylinder so that you can wash two or three shirtwaists and six hankies and seven towels in one operation while you sit and think how lucky you are. Fancy this little fairy in a hotel room, in the country, where the wash ladies are obsolete and your nurse won't wash—or where you don't want to trust your trousseau to any laundry resident in your rural haunt. And it is

invaluable for the baby's wash—because the baby is no respecter of labor and needs much rehabilitation.

It fits on any wash-stand, is simply made, easily cleaned *très bon marché*. So your parlor, bedroom and bathroom need not be a limitation to your wardrobe's perfection.

How many times have you toasted bread at your morning meal—the meal at which most of us are poorly adjusted? How many times have we nearly (?) sworn because your magic electric toaster only did the trick on one side of the bread? Now—there has been born a toaster which, when one side of the toast is done, "turns the other cheek" (by a pat of one's finger on a lever) and in most traditionally ethical fashion, so that you have self-turned toast, well cooked, waiting for you—disgruntled or radiant. It's a nice thought—to have toast without blackened fingers or disintegrated character.

Every sick room at some time or another needs, besides air, a gentle deodorant. In accordance with electricity's forward march an electric incense burner can be bought which though not in the traditional mode is very much to the manner of to-day.

Whether this will appeal to our Greenwich Village friends who espouse with all their modernity archaic methods, we cannot tell—yet would we suggest this device whether they be incensed or not.

Soon there will be on the market a wee electric washette—a portable six shirtwaist or twelve soxer which washes clothes and will spare the fare on silk hose or lingerie. Most city and country dwellings have electricity and in a few months this vital little machine will be yours for the paying.

Bathrooms to-day without the shower would be like the kiss to the strange maiden who liked it not, were her

lover unmustachioed. In order to have a faultless shower—for they are often built haphazardly so that they leak, spatter, burn and scatter—a standardized shower has been put on the market which, when ordered by the architect, can be put into any bathroom. It can be in curved or square design and in almost any size. After installation it can be finished in paint, marble, tile or in whatever uniform your bathroom mobilized. The fixtures are the most modern, completely covering the bather with sprays enticing and affording thorough refreshment.

Practically speaking, the electric washing machine in which boiling water is put is a perfect instrument. Yet we can see some instances where the self-gas-heated electric washer might be a great convenience if the clothes are not permitted to have the dirt boiled in and the gas jets left burning beneath them. To-day, to meet the demand of a self-heating washer, there are a few being put on the market.

Along the line of washing machines is a "filler" which acts promptly and swiftly so that the washing machine is filled and emptied of water with a minimum effort. There are two or three of these assistants on the market—two of which are good but one of which we think better. They can be tried before purchasing.

Electrified Tables

Furniture is furniture. That seems rational—it has beauty but not life. Yet in the Middle Edison Period in which we live, furniture arterially supplied with electric current has come to pass. Table tipping has gone out, but electrified tea tables have come in. There is no limit to what the electrified tea table might not be, or might not contain. Tea, toast, lectures or music fill its usual shallow depths. But now a veri-

table companion to man—not only a pal but an advisor. Yet you must be careful lest the amiable invention ousts the charm of tea itself. But all new inventions when they seem the most perilous are the most useful. Think of the charms of the electrified toilet table—shaving-water hot, curling irons ready, lights in perfect range. It is beyond imagination lovely. Then think of the electrified bed! It is too—Enough!

Overlooking the fact that an ironing board and iron are prohibited in many hotels, they seem to arrive in other guises. A folding contraption delightfully like a little box has been made and charmingly cretonned, which is itself the telescopic board and inside of whose folds repose the leveling iron, electric connections, etc.

Sleeping Accomodations

Gunpowder can be made out of the air, but that isn't what we are looking for—after all it's a constructive use we give it—breathing and health. Of late, people are longing for health—see the new religious sects. So the home longs for it, and devices are continually being made to give the home more air and better. An automatic device to make rooms breathe is now a practical thing. It looks like a little box of copper wire on one side, open on the other and fitted with little shutters so that the warm air escapes and the cool fresh air is imprisoned in the room. It is put on outside the window sash and without draft you breathe clean, fresh morning air.

You can always supply a bed to the new-comer, or make your living room into a more livable and sleeping one by the use of the new beds housed behind a small door in the wall which swing easily to position at night. The small door can be near the porch, so the sleeping porch by day can be free of bedding and be an upper

porch only. Furthermore, if the door be placed rightly, the bed can be swung to the porch or to the room. Rainy nights or cyclonic you could sleep indoors. It is not a folding bed with that device's many drawbacks. Of course this is more practically installed when the house is built, yet it can successfully be put in afterward. Its makers also offer a concealed ironing board—behind closed doors—which for a limited home is a comfort.

Should your home not have enough electric connections which, of course, it should have—you can now get electric sockets with two or three plug extensions. This can double your electric elasticity. For example, a lamp and an electric piano player can get their nutrition from one base plug—and you can put two bulbs in one plug. A makeshift, of course, but it doesn't look like one; and if your home was built in the pre-electric era you can keep up with the times with this device.

Lamps seem to-day to be one of the newer adjustabilities. A very useful lamp to fix on the piano to light the eye of the musical page will be a real convenience to the home in which the piano has to be in the living room. The whole room can be dark except for this illumination of the music pages—the audience can sit in darkness and have their comfort evolve from the lighted region. Here is a time when from sitting in darkness, light, comfort and good deeds may emerge. This lamp can be had in all wood finishes and can be placed on beds or chairs if wanted in these ways.

Not snubbing other devices at all, we must lump a few suggestions in electric apparatus. For example, the hair dryers, giving cold and hot air, the violet ray machines, the vibrator—all three made in convenient size and light weight. With these three things your boudoir is much more complete.

Yesterday, the silence cloth of cloth was all we had to put under your tablecloth. To-day asbestos in all its fire impenetrability is to be had in comfortable sheets for table use—to protect the polished surface in entirety and enrich the tablecloth. You have known the mats in asbestos—now you have the table rug.

Jars of pottery can be rapidly turned into electric lamps by a new device made to fit down in and raise above a lamp shade, bulb and complete paraphernalia. Think of the good uses some old wedding presents can be put to! This device comes in sizes to fit jars with 3″, 4″, 5″, or 6″ openings at the top.

Very nearly meeting the constant question: "Do you know of an instantaneous heater?" comes the electric water heater which when attached to your faucet gives instantaneous, exceedingly hot water. It is a small thing not more than 8″ high and will be a boon of boons when absolutely perfect.

During the summer, the attic gets overheated and makes itself an impossible place for sleeping. This need not be, as there is a material that comes in sheets to line the walls and ceiling. For cellars the warmth is kept in; for attics the heat is kept out. Could there be anything more simple and adaptable.

To close this chapter safely we can do no more than suggest a ready-made fence! It has been on the market years—for the pastures—but is now being introduced for the garden use of people who don't want to or can't make a new fence. It is delightful—of rough hewn wood, 4, 5, or 6 bars, posted and diagonalled. For a rambling place for roses and vines it has no equal and to be able to buy fences by the yard for the yard is veritably both joy and comfort brought to your very doors.

CHAPTER XL

Measure for Measure

"A PINT'S a pound the year around," said a little old lady dealing out some lead shot, to a young man gunner, who received a pint of shot for his pound and went off thinking he had begun his hunt with augury well imposed! "What's lighter, a pound of feathers or a pound of lead?" These two idea rousers never would have been born were it not for the average ignorance and negligence of weights and measures in the average time-bound home. True it is, if we are time-run we certainly are inaccurately measured and weighed, especially in our kitchens—where over-doses may injure, where under-doses and over-doses may ruin recipes!

There is really no need for this—we have had careful training in *our* youth with "tables." Recall herewith when absolutely perfect.

Avoirdupois

27.3	grains	equal	1 dram (dr)
16	drams	"	1 ounce (oz.)
16	ounces	"	1 pounds (lb.)
100	pounds	"	1 hundred weight (cwt.)

Dry Measure

2	pints	equal	1 quart (qt.)
8	quarts	"	1 peck
4	pecks	"	1 bushel
105	dry qts.	"	1 bbl.—vegetables etc.

Liquid Measure

4	gills	equal	1 pint
2	pints	"	1 quart
4	quarts	"	1 gallon
31 ½	gals.	"	1 bbl.

Linear Measure

12	inches	equal	1 foot	
3	feet	"	1 yard	
5 ½	yards	"	1 rod	
320	rods	"	1 mile	not quite indoors
1760	yards	"	1 mile	but useful to know
5280	feet	"	1 mile	

Square Measure

144	sq. inches	equal	1	sq.	foot
9	" feet	"	1	"	yard
30 ¼	" yards	"	1	"	rod
160	" rods	"	1	acre	

These are the classics over which we of the ancient régime trembled but which, in the new régime, youth imbibes in unwitting doses and grows in spite of itself into engineers and surveyors!

Yet for you and me there are still tables that may be of use and L. Ray Balderston in her *Housewifery* has published one which is worthy of quoting:—

4 saltspoonfuls	equal	1 teaspoonful
3 teaspoonfuls	"	1 tablespoonful
16 tablespoonfuls	"	1 cupful
2 gills	"	1 cupful
2 cupfuls	"	1 pint
1 cup	"	8 fluid ounces
32 tablespoonfuls	"	1 pound of butter
2 cups of butter	"	1 " " "
4 " " flour	"	1 " " flour

2 cups of sugar equal 1 pound of sugar
5 " " coffee " 1 " " coffee
1⅞ " " rice " 1 " " rice
2⅔ " " oatmeal " 1 " " oatmeal
2⅔ " " cornmeal " 1 " " cornmeal
1 cup of liquid to 3 cups of flour equal a dough
1 " " " " 2 " " " " thick batter
1 " " " " 1 cup of flour equal a thin "

To neutralize

2 teaspoonfuls of soda to 1 pint of sour milk
1 teaspoonful " " " 1 cup of molasses
½ " " cream of tartar and one teaspoonful of soda equal 2 teaspoonfuls of "home brew" baking powder.

But what of all this if we use a tea cup one time, a coffee cup at another for measuring, a dessert spoon one time, teaspoon another etc?

There is but one way to take the guess out of home cookery and that is have a set of approved scales, dry and wet measures.

A salt-spoon *is* a salt-spoon, even as a rake is a rake and not a hoe—a teaspoon has a standard size even as a peck is a peck and a quart is a quart. Those things have governmental regulation—and you should, of course profit by them.

In some communities you can buy weights and measures sealed with government approval. When possible this is a good thing. Always find out, however, before buying whether they have the sanction of the Standard Bureau in Washington. Or what *your* community's regulation may be.

Suppose you asked for a yard of ribbon in one shop and got short measure? You would *soon* detect it. Yet daily and hourly you accept a peck of "this" or a quart of "that" and never measure it when you get it home.

Home telephoning for groceries and meats have permitted more short selling than Wall Street ever dreamed of!

Every kitchen should possess the series of spoons—attached to one pivot. This set includes: salt spoon (¼ teaspoon), 1 teaspoon, ½ teaspoon, a metal (aluminum preferred) measuring cup with designations of ⅔, ⅓, ¾, ½, ¼, a glass cup divided into quarter cups for high convenience.

The glass graduate with spout, measuring a pint or a quart divided into easily read divisions is a joy in any kitchen.

Then it is easy to have a dry measure such as a quart wooden container—to measure things as they come from the grocer.

Scales and Measures

Scales must be like Cæsar's wife "above suspicion" —tested by local authorities for accuracy and worth the understanding that you will have them officially tested and "blessed" and sealed by the "Sealer."

There are many kinds of scales—avoid the kind which has a spring under the pan as the spring unless a very expensive one gets out of order. The hanging pan spring scale is generally good with per 10 to 20 lbs. capacity. It registers the weight automatically on the pan. The folding scale of the steelyard type is fairly accurate at a reasonable outlay and folds against a wall and is out of the way if not weigh. The counter beam or balance scale is most accurate if you have table space and promise to remember where you put the weights. It requires care as you have to do the marking by hand and no dial tells you the story. They are more expensive but more accurate. For all purposes the scale should be able to record from 1 lb. to 10 up to 30 lbs.

Liquid Measure

The quota here can comfortably be: 1 quart measure, 1 pint, and ½ pint—a 4 ounce graduate sub-divided to 1 dram or less. When buying those they should be cylindrical or conical with top diameter smaller than bottom diameter. These are purchasable in metal, enamel ware, etc. Must be made to wear; seamless and easily cleaned. The markings on these should be clear enough to avoid the gawky game of "Guess."

To avoid error in reading cone-shaped graduate, you will see that the subdivisions are more at base than at the top. "A 4 ounce graduate may be subdivided to ½ dram for each 2 drams, to 1 dram for the next 6 drams, to 2 drams for the remaining capacity up to 2 ounces and to 4 drams, or half an ounce for the interval between 2 and 4 ounces. In filling or reading, it should be held level and readings made at the *main* surface of liquid. Disregard the creeping up of the liquid on the width of glass." (This is governmental bulletin advice.)

Dry Measure

Here the quota can be a nest of measures from ½ bushel to 1 quart. These measures should be of metal or well varnished wood bound by a metal or some sort of band on top. Cylindrical here is the best style. If conical have them with their tops 10% or 1/10 larger than bottom diameter.

For your help:

Diameters of	½	bushel	should be	13¾	inch
	1	peck	" "	10⅞	"
	½	"	" "	8½	"
	2	quarts	" "	6⅝	"
	1	quart	" "	5⅜	"
	1	pint	" "	4	"

Length Measure

How many a step has been wasted looking for a yard measure, etc. Why not have a measuring corner in the kitchen and add to it 1 yard measure or a tape 3 to 6 feet long? Isn't that easy enough? A yard stick of course should be of well measured wood plus metallic ends or all of metal. It is most convenient if sub-divided not only into feet, inches and fractions, but into fractions of a yard. The more fractions really the less fractious will be your measurements.

Preserving etc.

For testing accurately water densities, hydrometers are used. If in your community you intend to do a lot of preserving or candy making, even in your own home the saccharimeter (a kind of hydrometer) will take the guess work out of the necessary thickness of a syrup's density. This is a short weighted spindle graduated from 0-70. When placed in water, the spindle rests on the bottom of the vessel and the reading at the surface is zero. As the density is increased, the spindle rises until when the solution is saturated with sugar at the temperature indicated—the reading is 100. This is an inexpensive one, another type mercury weighted is more expensive and more accurate. The vessel must be same depth as saccharimeter. A narrow vessel is best, so if you are doing much preserving a 250 cubic centimeter glass cylinder or a brass saccharimeter cup is the "easiest way." Buy the cylinder and thermometer with hydrometer. Temperature effect densities; with the three tools you are sure.

Thermometers

Thermometers are useful things, if they are *accurate* and as nearly unbreakable as possible. There are a few good ones on the market.

We cannot advocate the oven-door thermometer as there is hardly one which can stand the onslaught of banging and remain in on its accurate pinnacle!

Many a good stove and many a bad one have inveigled purchasers because of their neat little thermometer on their oven doors. They work all well and good for a while but you know a thermometer is a "dainty" instrument and must be kept well to keep well. However, there are many good thermometers built for pretty rough use—rough as any good instrument may be treated, which of course should never *be* rough.

The home could really afford the bath thermometer, the house thermometer, the kitchen and last and least the clinical thermometer, but the kitchen thermometer takes the guess work out of ovens' heat and prevents the "Fall of Doughs" a catastrophe like unto few in awfulness! It does away with thrusting one's hand in an oven to find out through our uncertain senses how hot is the oven, and often prevents a well burned finger, tongue when tasting or whole body when carelessness creeps in.

The thermometer is no half measure! It is a real necessity—it conquers feelings and tells the truth. If we are slaves to time in this world, why not switch our allegiance to the thermometer! Then with thermostats our rooms will be habitable because they have the right degree of heat, not because *one* feels it too hot and another feels it too cool, and too our food will not be wasted by under cooking or over cooking.

Buy only the best thermometers—others add girth to the junk-pile—and here we *must* practice *girth* control with all our vigor. Other thermometers useful at home are for incubator, deep fat frying, refrigerator, pasteurizing milk etc.

Some Precautions

Quantity as well as quality is necessary in household economy. For this reason, it is well to consider a few precautions and as there are a few confusing things in even our "tables" it is best to drive ourselves up to them like a timid horse is lead to face the terror that causes him to shy and free himself from terror.

The avoirdupois pound is larger than the Troy or apothecaries pound—avoirdupois is 7000 grains and the latter is 5760. But the troy or apothecaries' ounce is larger than the avoirdupois ounce. Troy and apothecaries' weight differ in the division of drams, scruples and grains (apothecaries').

Apothecaries' Weight

20 grains	equal	1 scruple
8 scruple	"	1 dram
8 drams	"	1 ounce
12 ounces	"	1 pound

Troy Weight

24 grains	equal	1 pennyweight
20 penny wgt.	"	1 ounce
12 ounces	"	1 pound (Troy)

In purchasing drugs and chemicals for the home, you may need to know these differences. Avoirdupois system should be used generally in bulk buying. But unless stiff regulations exist in your vicinity the apothe-

cary is prone to sell all by the apothecary system. Troy weight is used by precious metal purveyors so the house is little concerned here.

Fluid Ounces—Weight Ounces

Like the "Pint's a pound" fable so does "all ounces look alike to me" prevision disaster! The liquid ounce and the weight ounce *are not the same.* [In Great Britian, however, the fluid ounce of *water* does weigh an ounce avoirdupois.]

Dry and Liquid Quarts and Pints

Without strict ordinances in your part of the world pretty confusion exists in the leveling of dry and liquid dissimilarities. The dry quart is 16% larger than the liquid—so you see the loss incurred if liquid measure is used for a dry purchase! When you buy a quart at the hardware store for home use, you can find out whether it is dry or liquid by filling it with *water.* The dry quart measure should weigh 2 pounds 6 ¾ ounces, the liquid quart would hold but 2 pounds 1⅓ ounces of *water.*

Uncertain Quantities

The barrel measure is *somewhat uncertain— It is best to find out your state regulations.* The barrel differs according to state law and commodities sometimes. March 1915 a law was passed by (National) Congress. This applies to all dry commodities except such as have been sold by weight or numerical count (flour, sugar and cement). The standard barrel has a capacity of 105 dry quarts. The liquid barrel's capacity is generally marked on its side.

Sacks and Bags

You are prone to "get the sack" here unless you are careful. There are usually 94 pounds of cement to the sack and 100 pounds of sugar. In the case of flour the weights are usually in multiples of a barrel ½, ¼, ⅛ etc. expressed in pounds, but the custom is growing to drop the ½ pound, ¼ pound, and ⅛ pound, from the weight of ⅛, 1/16, and 1/32 barrel size and make their weights 24, 12 and 6 pounds. (Barrel of flour has 196 pounds.) Potatoes generally weigh 2½ bushels to the sack—according to weight per bushel in your own State.

Heaped Bushel—Bulky Vegetables, Fruits etc.

In different states the heaped measure is heaped differently, in some the measure is heapable to the point where the commodity falls "down and out," in others the cone above the measure has certain lawful dimensions— So find out before you are fooled.

In buying peas, dried beans etc. be sure they are measuring your purchase by *dry* not by liquid measures—or you will lose 15% of your purchase!

Baskets

Basket sizes are just about standardized to 2 quart, 4 quart and 12 quart baskets.

Boxes for Fruits

A national law says that the standard basket or boxes or container for small fruits, berries and vegetables shall be of the following capacities:— Dry half pint, dry pint, dry quart, or multiples of the dry quart.

Cords of Wood

Practice differs here in large measure— Purchasers must find out local laws. In most States a cord of wood is 128 cubic feet—in piles 3 x 8 x 4 foot lengths. The lengths, however, into which wood is cut in some places is 3, or 2, or 1½ feet! Measurements are sometimes made before and sometimes after splitting. The basket in some states measures fractions of cords, occasionally it is equal to a heaped bushel, in other states it is more specifically designated. Look up your laws, here all your safety lies!

Containers

Finally, check up the contents of your containers and notify the makers; you will help the public and the manufacturer. Statements of weight are in avoirdupois terms. Packages of 2 pounds or less are exempt from marking, and containers below 1 fluid ounce come under this exemption. Notify the maker if loss exists; it is a public service.

Losses often occur from evaporation, leakage, bad packing, and consequent deterioration before opening. The manufacturer will be glad to get a notification if he is of integrity so that he can take steps to correct his measure. Here is real need for a good scales and measuring cups.

The contents of a cylindrical can or paint pail can be determined:

Measure circumference with a tape.
" height " " "
Diameter of can equals $\frac{7}{22}$ of circumference.
Subtract from circumference a slight amount for thickness of can.

Multiply the result by itself and the product of $11/14$.
This result should be multiplied by height of can less proper allowance for inset and thickness of ends.
The result (if you have used inches) will be the cubic contents (in inches,) it can be reduced to gallons or fraction of a gallon by dividing by 231.

These precautions are only a few in the course of home buying. But we hope they will be suggestive.

Know your state laws.

No home should be—no matter what its scale—without a scale, a liquid, as well as a dry set of measure.

It is wisest to buy and sell by weight as the heaping systems vary. It is fairest to customer and more comfortable to merchant. If you and every one insist on this fashion—it will prevail in the future.

Addition and Recapitulation

Finally we have added to our familiar weights, measures, thermometers and scales—the hydrometer for candy making, preserves etc., the water meter which you don't realize is working away in your home, the electric meter which silently subtracts coin from your pocket too, the gas meter which is just as financially obstreperous and if you are inquisitive meteorologically you may too have a barometer to tell the atmospheric pressure and presage the weather and the hygroscope or psychrometer which will measure the humidity in the air. These things are the measures which will take the "uncertain" out of your domestic sailing and be an all encompassing compass for all your goings, comings, and weighs.

But above all don't forget the egg timer—or the clock for without these two things marriage can be a brittle thing and homekeeping an anarchy.

CHAPTER XLI

TAKING THE KITCHEN ALONG

IT is no longer necessary for motorists to trust to luck and the roadhouse restaurant for lunch. They can take their own kitchen along and loiter down the highways and byways and eat where and when they will. Manufacturers who have studied the requirements of motorists provide the neatest imaginable bits of equipment for use on the road. With them you can be as comfortable in the Gobi Desert as at home.

The best known of these pieces is what is called the "Restaurant," a ship-shaped glazed duck or sole leather case equipped with knives, forks, spoons, cups, saucers, butter jars, sandwich boxes, vacuum bottles, salt and pepper shakers and napkins, for from two to eight persons. They can be strapped on the running board or back rack of the car or slid unobstructively into the tonneau. They are shaped usually like suit-cases, although one firm makes them in a flat, square shape of sole leather, black grain leather or glazed duck (patent leather).

There is a case of this kind on the market that carries a cooking apparatus, a long fork and a folding gasoline cook stove with two burners. This burns ordinary gasoline, which the motorist always has with him. There are no loose parts to assemble or become lost. When it is folded all parts are enclosed easily and rapidly and the case fastens securely and simply. It can be bought separately or in combination with the above case.

These cases are built on a basis of bass or some other strong wood and are practically unbreakable.

If you prefer a wood fire to the gasoline stove, there are small grates to be had which aid greatly in the building of it. These are light in weight and can be carried easily.

Long ago the vacuum bottle solved the problem of carrying cold and hot food. It is made in many shapes, styles and forms. It insures comfort for the long or short tour, and if a little care is taken in the handling there is no danger of breakage.

The best of these bottles are made of glass well annealed, insuring elasticity. The outer walls are generally of steel and relieve the jarring. The inner wall is also of steel, and between these walls is the vacuum, impenetrative to heat and cold.

These jars and bottles hold from one pint to one gallon, so the range of choice is vast enough for utility. The stoppers are so made and fitted, plus their caps, to prevent leakage of wind or advent of outside air, that the temperature probably never changes more than a few degrees in twenty-four hours.

Cases for these bottles in various sizes are made of leather, duck and wicker. They are convenient and absolutely necessary to the longevity of the bottle as it is so adjusted in the casing that it rests and vibrates enough to ease strain which might overcome the elasticity of the glass and cause breakage.

The bottles themselves are finished in leather over metal or in metal containers, and some come equipped with handles and also with convenient cups.

Another invaluable aid in an automobile trip is the fireless cooker, which makes a hot meal at any time a reality. Start it before the trip begins and by meal time you'll have a real dinner, not a pseudo-feast.

These fireless cookers can be had, so don't forget them in planning a trans-desert tour amid sands and dry winds.

Refrigerators

There are on the market admirable ice-boxes for the motorist. These come with partitions for ice and partitions for food. Some have racks in which bottles and other things are held firmly. The wicker basket lined with metal is a useful one and has a convenient carrying handle. It is of the finest workmanship of imported reed, with hardwood bottom covered with two coats of mineral paint. The covers are of three-ply basswood finished in dark forest green. There are straps to fasten the cover, and the hinges, buckles and nickel-plated fixings are of perfect workmanship. The lining is nickel-plated zinc and especially insulated against aggressive, unwanted, outside air.

The iceless refrigerator is an ice saving and remarkable device which "works" on the old evaporation cooling principle. The two earthenware crocks, which fasten together, are submerged before filling in clear water. When kept in a draught or in a moving vehicle or in a window, the evaporation process cools the food within. This device saves ice, the cool air doing the work.

The other refrigerator boxes are excellent, too, with their fine installations and vents for melted ice. These are generally leather covered and zinc lined.

Cooking Outfits

Campers use cooking outfits that motorists do well to copy. For example, the cooking outfits made of hard seamless aluminum, for from two to six persons, include, in the smallest set, one frying pan, two cooking pots,

one coffee pot, two plates, two cups, two soup bowls, two knives, two forks, two dessert spoons and two teaspoons, all nested together in the big cooking pot, and weighing six pounds six ounces. The outfit measures 9½″ x 8¾″, all wrapped in a canvas case.

The nest for eight includes: three cooking pots, one E cooking pot, one large coffee pot, two frying pans, eight dessert and eight teaspoons. It is only 11″ x 12⅞″ nested, and weighs 18¾ pounds. It can be attached in canvas case to rear or side of running board racks, or carried in the car.

If aluminum is too expensive, there is always the very same kit in steel, heavier, of course, but just as compact in size. All are seamless and best quality.

There are also pocket kits which weigh about 31 ounces and measure 2″ x 3⅛″ x 8½″ and include a folding broiler, racks which thrust into the ground, two frying pans with detachable handles and which when fitted together make a perfect roaster. All fold neatly together and there is room for knives, forks, etc.

If this list of accessible accessories does not fire your desire to take to the open road, nothing will.

CHAPTER XLII

The Fire Hazard

THE chief underlying reasons for fires in civilized communities are: carelessness, ignorance and panic. The immediate causes are: kitchen stove and range maladjustments; heating stove and furnace pipe lapses; trouble in chimney flues and pipings; carelessness with lamps, gas, oily rags, cleaning fluids; soot deposits of soft coal; spontaneous combustion; bad insulation; no insulation; cigarettes, etc.; no means to put out a fire when it starts; and, topping it all hidden electric diseases cause almost more fires than any other one cause.

In rural farm communities there are the forest and brush fires, which we need consider but grudgingly here, the many fires which catch from roof to roof, and the fires from the chimney which start one's own roof afire. Then there are lightning, incendiary fires by tramps, kerosene oil lanterns; creosote from the smoke and soot in wood-burning communities disintegrates the mortar in the masonry, and as the woodwork comes in contact with the chimneys, fires are the result. To these are added the other hazards common to all modern life today.

Farmers or those living out of the range of the fire department should be more especially equipped against fire than any other groups. For example, a ladder is a great necessity, and yet many people who are in isolated places never spend a little money on a good one that might save the roof and then the home, to say nothing of lives.

Dirty lamps with loose connections cause many a fire and should be thought about seriously. Wet days on the farm are great fire makers, for clothes are put near to the fire, and whoop la!—a very warm fire ensues! Candles, too, are handled carelessly and should be treated as inflammable material when they are lit. Most ashes will spontaneously burn if set away, as the fine bits of coal and grease adore fire. Lanterns plus hay if not carefully used are another cause of fire. So carelessness really is the root of 99% of fires, and yet we indulge ourselves in this ruthless pleasure.

Probably the kitchen is one of the best little hatcheries in the home for fires. Why that is, is easy enough to see. The chief cause here is negligence and its first cousin, ignorance.

Fires are swift followers of these conventions:

Ignition of wood floors under, or walls back of, stoves; drying wood in ovens; kindling left over night too near the stove; clothes hung on backs of chairs too near the stove or on the clothes horse too near to the stove, especially if they have been cleaned with gasoline or other cleaning fluids; thin clothes, flimsy sleeves catching a flame make delightfully hot and dangerous fires.

Fires may be guarded against in these ways:

1. Metal shields projecting at least 6″ at the sides and back and 12″ in front of ash pans should be placed under all kitchen stoves standing on wooden floors.
2. All ranges on wood or combustible floors and beams that are not supported on legs, and have ash pans 3″ or more above their base, should be set on brick foundations.
3. Large ranges, if under combustible ceilings, should have metal hoods above with a ventilating

pipe passing through to the outer air through a sleeve or asbestos packing.

4. Wood stud partitions back of ranges standing 12″ or less away should be shielded with metal from the floor to at least 36″ higher than the ranges.
5. It should be remembered that tin, zinc or sheet-iron used to protect woodwork from the heat should be so placed that there will be an air space between it and the wall.
6. If a metal is against the wood, it only serves to conceal charring without preventing it. Bear in mind that bright tin reflects more heat than sheet iron.
7. Watch stovepipes for parted joints and rust holes; clean soot from chimneys and stovepipes at stated intervals; do not allow plaster back of stoves to remain broken.
8. There is now a fine asbestos product made which is a mixture of cement and wood and asbestos which if placed under the stove or even back of it will prevent fire. This material is not cold to the foot, can be highly polished and is most delightful in a well groomed kitchen. This too can be used for table tops and is polished by a mixture made for its express demands.

This asbestos wood is invaluable for partitions, obviating very thick and expensive walls; and due to its lightness it can be used for light frame houses and insure fire protection. It is used for switch-board and other insulations by electricians, etc. It takes various stains and finishes in imitation of wood or marble, is rigid, light and fireproof.

It is the same physically as wood except that it is fireprof, takes a higher polish and is harder. It can be used not only for making walls, floors and ceilings fire-

proof, but window casing, partitions, base-boards, cabinets, and all trim. It is moisture-resisting and impervious to weather conditions.

The people that are the most careful of the pocketbook seem to forget the ordinary fire peril and don't seem to realize the necessity for concentration on the cures, probably because they are optimists and do not think of any trouble—yet why pay so dearly for optimism?

For example, most stoves should be at least 24" to 30" from these things that combine so affectionately with them and should be at least 6" off the floor if not standing on metal or asbestos wood. If lath and plaster are protected by a metal shield, then the stoves can be within 18" with safety. A fire proof material should be at least 36" square on the floor to catch flying embers from stove or fire.

The fire clay linings in the stove should be watched and seen to be sound, and the fire in any stove should never be made above the fire clay linings. Possibly you have not heard of these things before and they sound like the cry of the alarmist. Never fear. It is better to cry before you're hurt, sometimes, than afterwards!

Never put kindling wood in the oven.

Deposit all ashes in metal receptacles or upon noncombustible floors, removing same from building at least once a week. Barrels or boxes should not be used for storing or carrying ashes unless they are constructed entirely of metal.

Before starting fires in the autumn, thoroughly clean out the furnace and flues thereto, also the fireplaces.

Carefully examine them and immediately repair or replace any defective part. Don't burn out chimneys and flues by making an especially hot fire with paper, etc. Main chimneys should be cleaned from roof to

cellar. All stovepipes where entering chimneys should be provided with metal collars and rigidly fixed in place. Replace any tile, crock or flimsy flues and chimneys with substantial brick chimneys.

Gas stoves or other heaters should have a ventilating flue to carry off the burned gas fumes, which are poisonous. Do not use portable rubber or similar tubing, but connect all gas stoves rigidly and securely with gas pipe. Examine valves and see that they are tight and do not leak.

Never permit a stove of any kind to be set up without stone, brick, concrete or metal protection underneath, or near a partition without a metal shield and air space. Never run stovepipes through partitions, or paste paper over flue holes.

All types of open fireplaces or stoves, especially where there are children, should be provided with substantial spark screens.

Don't throw waste paper on an open fire unless you watch it more than carefully.

Every period of extreme cold results in numerous fires due to forcing the heating apparatus. Keep this in mind next winter. Watch your heater.

Keep hoods and pipes of kitchen range free from grease and lint by cleaning with hot water and lye.

Do not hang clothes or bags near stoves, or on stovepipes or steam pipes or on electric bulbs. In the case of the recondite furnace whose being we take for granted, the same principles apply as to the stove. For safety, asbestos about the wood and adjacent places makes safety sure, and if safety first doesn't apply here where does it? It will at least keep the secretive fire below stairs from breaking bounds.

Where pipes, flues, etc., pass through woodwork there should be asbestos or metal protection to the wood or

else here again we will be victims of a lapse of precaution.

Sometimes fires have occurred by the closing of all registers in a house heated by hot air and the unnatural heat left in the furnace overheats pipes, etc., to a dangerous degree. In some homes so heated there are two registers which cannot possibly be closed, and obviates overheating.

Inspection of flues to see that deteriorated mortar will not permit the exit of fire to surrounding woodwork will prevent many a fire. Very often where joists and beams rest on chimneys and are not sufficiently insulated against the ravages of faulty construction or wear, they will catch fire slowly but surely.

Faulty joints in pipes are many times the cause of fire when the rest of the home is perfectly guaranteed against it. For example, when a stovepipe is fitted into another there should be at least a 3″ lap to make a safe joint. Imperfect junctures of pipe and flue, pipe and pipe, make for the escape of sparks and consequent fire. Stovepipes should not pass through a floor or plaster partition or any concealed place, lest a parted joint or rust holes may cause mischief.

Nor should any pipe that is likely to be heated pass through an attic where fluff is bound to accumulate, unless this pipe be insulated with asbestos to prevent ignition. Neither should a stovepipe pass through a roof, window or siding even of a summer kitchen; and the running of a very long stovepipe perpendicularly into a chimney is also hazardous.

A stovepipe or a chimney, no matter how well isolated by zinc or what not, can set the ordinary shingled roof on fire by the escape of fiercely burning bits of soot and cinder. Many a roof has been burned this way, to say nothing of the whole house.

There is to-day, besides the heavy tile, metal and composition roof, an asbestos roofing in the shape of shingles of any color and shape that will wear indefinitely, and is absolutely fireproof, moisture-proof and light enough to be put on any house. Furthermore if you don't want to remove the old wooden roof, this shingle can be put over it and make a better roof than without the old one, as the insulation value of the wood will keep the attic warm in winter and cool in summer. There are many asbestos roofings, the best of which are made of asbestos fiber, cement; these are made in all colors, sizes and shapes and can be put on by any roofer. There is never any reason to repaint or repair them, and if they are a bit higher at first in price than the ordinary shingle, you save in the lack of upkeep and the fact that no sparking can go on between your neighbor's roof and your own or between your chimney and your own roof. Copper roofs now are within the scope of more purses than heretofore.

You have to remove stains from your garments, and for this may incur death and destruction by fire quite readily. But death is not necessary if a few precautions be taken. Keep the gasoline or whatever you may have in a can that can be bought for the purpose. Then don't deposit it in the stove or near it, but away from it where there is no chance of any fire coming in contact with it. Don't clean your clothes with these fluids in the smoking room or the kitchen. If possible clean them outdoors.

Fuels

Wood as a fuel is dangerous because it burns rapidly, makes a lot of ashes and has to be replenished so often. Kerosene makes a lot of trouble because there is such crass ignorance in its use. Some people seem to love

to fill a lamp when it is burning. Of course this is the worst thing that one could do. And others dote on pouring kerosene on an open fire. Gasoline is explosive and as a fuel for the home not at all warranted. Water won't be a very good extinguisher in these cases, but we will talk about extinguishers a little later on.

When you realize that six percent of all fires are caused by lamps it will do no one harm to learn the following rules by heart and by brain:

Kerosene should always be handled by daylight and away from all flames and fires. Under no circumstances whatever should a lamp be filled while its wick is lighted. After filling a lamp both the burner and the reservoir should always be carefully wiped free from oil films.

When a lamp is not burning it is well to keep the wick a little below the top of the tube. This helps to prevent oil from working over the burner and reservoir.

Lamps should be filled as often as they are used. Especially do not light a lamp when the oil is low in the reservoir. Never use a burner which fits loosely upon the rest of the lamp. Never use a lamp wick which does not fit the tube provided for it. Never blow out a kerosene flame downward. Turn down the wick a little and let the flame go out of itself.

If you must blow it out blow upward through the burner or across the top of the chimney. Both of these methods produce an upward draught.

Do not try to carry a blazing lamp to a place of safety. The least agitation may cause an explosion. When the lamp is well filled there is small chance of gas forming in it; but as the oil is consumed explosive gases form.

A burner that is kept clean and bright radiates heat, while a dirty one conducts heat to a lamp.

Glass lamps are especially dangerous. The dropping or breaking of lighted lamps and the spreading of burning oil annually bring havoc to many hundreds of homes.

Medicaments

As well as cleaning fluids the presence of medicine and liniments made of ether and chloroform and alcohol are always causes of fire when not properly housed in the right kind of metal medicine chest and not directly over or near a gas jet or oil lamp. So remember to use carefully anything with these chemicals or camphor, varnishes, turpentine, benzine or gasoline. Keep them in tin cans, which are to be had for them. Use them in daylight.

Never leave rags around saturated with oils, medicines or greases, because spontaneous combustion will take place.

According to the National Fire Protection Association, the attic, cellar and all closets and outbuildings should be cleaned at least once every year, and all useless material and rubbish removed therefrom and burned. These unnecessary accumulations are dangerous, and are the causes of many fires. Store all remaining material neatly so that a clear passage may be had between or around boxes, cases, barrels, etc.

Metal waste baskets, only, should be used.

In storing clothing, first remove all matches or other material from the pockets and then carefully fold and neatly place away. Do not hang clothes where they will be near hot chimneys. Do not go into closets with lighted matches or candles.

Care should be exercised in burning leaves, dead grass or rubbish. Keep these fires a safe distance from buildings, and never light them on windy days.

Do not bank houses in winter with straw, excelsior or other readily inflammable material; a chimney spark or carelessly thrown match may ignite it.

Use safety matches, and make it impossible for children to get them. Always place burned matches in metal receptacles; never throw them on the floor or into waste baskets.

To smoke in garages, in beds, or around stables containing hay is deliberately to invite disaster.

Swinging gas brackets are dangerous, and never should be allowed near curtains or dressers. Fix them rigidly so as to avoid contact with combustible material. If open gas flames are within two feet of ceiling, see that ceiling is protected with sheet metal or asbestos board. Tips for gas lights are inexpensive, while a light used with a broken tip or without a tip often causes fire. Don't use gas pendant mantles unless protected underneath with wire gauze. Hot carbon deposits form and drop from mantles of gas arc lamps. A globe closed at the bottom is safer.

Examine the gas meter, see that it is securely set and well connected, and is not located near open lights or furnaces. An outside gas shut-off valve to service-connection is desirable. Never look for gas leaks with a match, candle or lamps.

Where a dwelling is lighted by a gasoline vapor or acetylene gas system the rules governing the safe use of these illuminants should be carefully studied and rigidly observed.

Illuminating oils should be kept in closed metal cans in a safe place, and lamps should never be filled except by daylight. Kerosene lamps should be kept clean and properly trimmed. If allowed to burn all night, select one that contains much more than enough oil. A dirty lamp containing only a little oil is unsafe.

Do not use paper or decorative shades of inflammable material on lamps or electric light bulbs.

Electricity can be a real hidden peril and extends throughout the wire system in a building. Be sure it is safely installed, and have the system carefully inspected and approved by a recognized electric inspector. Many fires are due to defective electric wiring. Do not destroy insulation on electric light, fan or heater wires by hanging them on hooks or nails. Immediately repair or replace any defective switches, fuses, sockets, etc. A fuse is the "safety valve" of an electric system, and should never be replaced by one of larger size or any other material.

Before attaching electric irons, vacuum cleaners, cooking utensils or any other electrical device to your lighting circuits or sockets, consult an electrician as to the ability of your wiring to withstand this additional load. Electric wiring systems are designed to carry only a certain current, and if overloaded may cause fires. Numerous fires have been caused by leaving electric irons with the current on. Disconnect them immediately when through using. *Electricity is safe but carelessness is unsafe.*

Heating and Garage Hazards

Coal and kindling should preferably be kept within a brick or stone enclosure and not stored against frame partitions nor directly against walls of boiler or furnace. It is well to see that the garden hose may be attached to the kitchen faucet.

Never allow open flame lights in a garage. When filling the tank, run the auto outside, so that gasoline vapors will dissipate.

Do not keep quantities of gasoline or calcium carbide inside of garage or dwelling. An approved under-

DETACH PLUG FROM IRON AS WELL AS FROM SOCKET IF YOU WANT YOUR HOME INTACT

Courtesy of N. Y. Edison Co.

DON'T PULL THE CORD A MILE ABOVE THE IRON TO DETACH, BUT TAKE IT DOWN CLOSE TO THE IRON. THIS SAVES THE WIRES AND FIRES

Courtesy of N Y. Edison Co.

SHE HAS PREPARED THE WAY FOR A NICE LITTLE FIRE

SHE IS CAREFUL AND HER IRON WILL NOT PRACTICE ARSON

ground storage tank is the safest method for keeping gasoline.

A metal waste can should be located at a convenient place outside the garage for all waste and greasy rags. Burn these every week. Never use sawdust or shavings to absorb grease and oil. Scrub floor (if wooden) occasionally with hot water and lye.

The use of gasoline for cleaning parts of the automobile in the garage is a dangerous thing.

The garage should not be heated by means of stove or open fire of any kind, unless same is isolated in another room so that the gasoline vapors of garage cannot possibly get to it. Gasoline vapor travels. Being heavier than air, it seeks low levels. Ventilation should be arranged to take care of vapors collecting near the floor.

Keep an approved fire extinguisher and a pail of sand in the garage. Water thrown on burning gasoline merely serves to spread it.

In many cases water will quench fire. But in the case of oils, alcohol and other volatile liquids and grease fires water simply spreads the fire and you are in more trouble than you were at first.

The Big Eight

The eight firemakers in the order of their devastating power are as follows: Electrical, due to carelessness and lack of proper inspection; matches and smoking; defective chimneys and flues; stoves, furnaces, pipings and boilers; spontaneous combustion; sparks on roofs, and petroleum and its products. From 1915 to 1919 the value of fires from these causes aggregated $1,416,375,845. Is it any wonder that there is now agitation all over the United States to have at least thirty minutes given each week to the study of fire pre-

vention? Saving the home is better even than building more homes.

Extinguishers

Every home, of course, should be equipped with the best possible extinguisher. There are any number of them on the market. Do you know of many motorists who refuse the call of the extinguisher? There are not many who have not one in their car, yet there are few homes with them. Large homes should have one on every floor. Small homes, even if they have not enough footage to lower their insurance rates, should have them to reduce the fire hazard.

What kind should the householder buy? The chief thing here is to buy one that has no fancy method of operation, that simply by inverting the container turns on a forceful stream; light as possible in weight, not over 25 pounds and preferably about 12, so that a woman can use it. Right there it is interesting to note that *The Fireman's Herald* reports that women daily put out more fires and obviate conflagrations than men; that were it not for the fact that women put out so many, the fire peril would have been far greater.

Other things that you must demand in the extinguisher are that it must have at least a stream of 20′ long; that there must be no suffocating fumes from the chemical's contact with the fire; that the chemical must be as nearly stainproof as possible so that in a small fire the room is not unnecessarily disfigured. The chemical must not freeze readily at least not above 27 or 28 degrees Fahrenheit.

There is one extinguisher on the market to-day that is gaining mightily in favor, because it spreads a foam over the fire and cuts off the oxygen, and the laying of the foam prevents a flash-back when the fire is nearly

out. At first this was used in the extinguishing of oil fires, the heaviest and most difficult of all fires to put out. For example, where a chemical engine took an hour to do the trick this foam type took a few minutes.

This has the added power of expanding over eight times its bulk in the container when released, so that if the house type is used the container need not be over ¾ gallon and you really have about six gallons of material for the fire. This does no more damage to draperies than would water. It does not injure cottons or wools and does not penetrate fabrics as many other chemicals do. If it gets on one's clothes it is easily brushed off after it dries. On polished and varnished furniture it has no effect and is easily washed off.

Service

Reliable firms will always tell you correctly what kind of an extinguisher to buy for your particular purpose. They will, too, in compliance with the Board of Underwriters' rulings, watch the apparatus once a year and recharge if necessary. Actually they don't always need it, but it is a wise ruling of the Board.

There are some extinguishers excellent for outdoors, motor boating, etc., but which indoors are apt to give off suffocating fumes.

There are extinguishers of large capacity on wheels for large homes and large estates. These are a great insurance against fire. They are built on narrow gage wheels for rolling on floors in the house and heavier construction for outdoor use. Many big estates use these little two wheelers, as they are fire departments in themselves.

A good quality fire hose is a mighty good assistance in a large home, too, and is becoming very widely used. Of course, there are many fires that water not

only will not quench, but will spread; on the other hand, there are many little conflagrations that water immediately will kill.

Another good method, but not as efficient, for use in all conditions is the telescopic fire bucket set. Six pails are set in a container in the liquid and all one has to do in case of fire is to open the lid and each pail comes out filled. If the fire is not great and has just started and is within a few feet of you, this is all well and good, but one can hardly throw water from a pail as far as ten feet above your head, while with the extinguisher the stream is from twenty to forty feet in length. This pail system would not reach a roof, you see, which the extinguisher might.

An intimate acquaintance with the wizardly asbestos will do a lot in the home to keep the hearth fires burning in their right places. The asbestos ironing pad on the ironing board is a good resilient thing. Although not in this case primarily meant as a fire preventive, it will stop the iron from causing a big fire, even if it should burn off the top sheeting, for when it reaches the asbestos the fire will go out.

There are now some very convenient collapsible ladder escapes which are stored in a small box near the window, which makes the escape from a fire not dependent on ancestors who were tight-rope walkers.

There are regular fireproof builders who do naught else but fireproof work, but in this article we are only concerned in the home after it is built. Yet we cannot refrain from saying that the right architect and the right builder at first will reduce your fire hazard: they will adhere not only to the Underwriters' rulings but they will build a house so that its insulation (electric), air insulation and circulation and partitions will be done according to safe and wise arrangement.

Don't do foolhardy things and think you can get away with them.

Have the telephone number of the nearest fire station on a special card at your telephone, or have fire departments in your own home—extinguishers.

Familiarize the family with the operation of the nearest fire alarm box. After operating a fire alarm, stay near it to direct the fireman to the fire. Every minute is significant.

Don't fail to notify the chief of the fire department of anything you may see that is dangerous or liable to cause fire.

We could say to-day that in the home millions are spent for fires, but hardly one cent for prevention of them. Should we not as enlightened human beings take thought and save the world some of its useless expenditure of life, limb and extravagance?

There is now on the market a new little extinguisher weighing about two pounds.

CHAPTER XLIII

TAKING CARE OF THE HOUSEHOLD EQUIPMENT

AS we have intimated before in these articles, the best of everything may be yours, yet if you care for them in slovenly, careless or uninformed ways it will be as if you had nothing whatever of any value.

The persistent ignorance of the seemingly most enlightened and experienced housekeepers as to the use and care of the refrigerator is appalling. It is positively amazing to see the breakage of sane rules of procedure in favor of what seems to them proper. For example, the best of housewives will insist on filling the ice chamber of the refrigerator with but a suspicion of ice and a riot of food, whereas the ice chamber is meant for ice, and ice to the limit of its capacity, not once a week but every and all day. Unless this is done the air currents over which the manufacturer has slaved to make possible will not occur, and the best refrigerator becomes a useless thing. You might just as well get a packing case and stuff it full of ice and food. The ice chest must be full in order to cool the air and start the heavier (cool) air falling through the chest, which as it descends gets warmer, rises, passes over the ice, cools again and drops—and so on in endless circulation. It is these currents which keep the refrigerator cold; it is not the ice cake itself. In a little ice box, yes, the food has to be put into the ice chamber as there is no other, but here you are not depending on the melting of the ice starting air currents to descend and to rise. The problem is quite a different one.

We think probably the difficulty with the owners of refrigerators is that they have the ice box in mind and it is an inherited notion that the food must be in close proximity to the ice. This paragraph may seem a digression, but it is purposely put in to emphasize the fact that the ice box and the ice refrigerator are two very distinct and different things. Therefore, be it remembered that in the refrigerator you must not waste the ice by cuddling warm provisions next it, because your ice is like a battery. It, too, makes currents—not electric, but air currents.

Now then, when we have the ice-making currents, what happens to the air of varying degrees of temperature? The coldest air is at the bottom of the refrigerator (of course we are always thinking of the best refrigerators) because cold air is heavier than warm air and the warm air rises. Therefore, if you have odorous things do not put them in the ice chamber because the air starting down will carry odors along. Put the odorous things and the things that should be kept coldest on the lower shelves.

In some chests the currents of air are so good that onions and butter never exchange compliments—a highly snobbish society where there is little amalgamation.

One buyer of an expensive refrigerator said that his refrigerator was a great disappointment because the ice chamber leaked. Now this was a strange thing, for these ice chambers are made of the best workmanship known to refrigeratordom. Everything was questioned: Did you keep your ice chamber full? The reply: Yes. Did you keep things other than ice in the ice chamber? The orthodox answer came: No. Do you close the door of the ice chest completely? Answer: Yes.

So the repair man went to the house to give the erring chest a stethoscoping and found that the floor of the ice chest's compartment was a little uneven and the water was forced from the melting ice into foreign channels and escaped through the front of the ice box, dropping in streaking lines on the front façade.

This is but a minor point, yet the refrigerator or the stove or the vacuum cleaner or the anything is often blamed for misplacements, lack of care and ignorance on the part of the operator, and this article is meant to forestall a very few of them.

Here, then, are some things to watch out for:

1. Keep the doors of the refrigerator closed always. If they don't close easily, see to it that something is done to make them close.

2. If you have a refrigerator with a lot of movable parts it is well to remove them and immerse in hot water occasionally. But don't buy one that has many outgoing parts; it's unnecessary and a constant bother to adjust.

3. Once a week wash out the whole chest with warm water and soda; never use strong smelling soaps. Ammonia can be used but it is probably best to use soda. Hot water cleans better, of course, but it will give the ice more cooling to do and if the box is cleaned regularly cool water ought to do the trick well enough. However, every so often the hot bath is a good thing.

4. Every day wash off the ice that newly enters the ice chamber.

5. Never wrap the ice in paper thinking to save ice, because ice only makes cold air by melting. Here is a place where the good and saving housekeeper saves ice to the destruction of her food stuffs, yet this is the hardest bit of politics to propagate.

6. If the lining gets discolored use some harmless preparation to remove the stains.

7. It is sometimes a good idea to put a piece of waxed paper around highly odorous foods.

8. Wash everything in the way of utensils that are put in the box. Have a regular refrigerator set of dishes.

9. Wash vegetables before entering, for if there is anything introduced in the way of foreign matter, the enemy alien may make for odorous trouble.

10. Cover any receptive foods; it's wisest even with the most perfectly ventilated refrigerators. Liquids will dry up a bit with a dry air circulation and egg yolks kept in water will keep better if the water is changed daily. If dampness collects in your refrigerator something is wrong.

11. Wash off the outside of refrigerator with damp cloth every week.

12. Remove ice rack and scrub well in water and soda weekly.

13. Boil parts (removable) twice a month or use very hot water.

14. Dry case thoroughly after every douching.

15. If the refrigerator is well connected to drain, a little hose to flush the interior will be simple and easy.

16. The drain pipe must be carefully flushed, as here the invading army of typhoid, etc., loves to encamp and make inroads. See to it that the drain pipe is easily removed and cleaned and that the drain pan (should the drain pipe have no outlet into the plumbing system) be easily removed at least once a week to be cleaned out.

With these few words we will leave probably the most familiar bit of household mismanagement to a

reforming public, and pass on to some floor coverings.

In the case of linoleum and similar floorings we will take for granted that they are perfectly laid down and that all that there is for us to think about is the nursing of them. Even the cheaper (printed and not inlay) of these floorings will last years if the following suggestions are absorbed and put into regular practice:

Sweep linoleums daily. This is easy.

Use an oil mop daily.

Never use anything but a mild soap and tepid water for cleaning.

Then rinse with clear water and dry thoroughly. It should be done a square yard at a time, each yard carefully dried before going to the neighboring yard. Do not flood when a mop is used.

Elbow grease, mild soap and warm water are all that is necessary.

Avoid as the plague: lye, soda, potash and all cleaning inventions which may harbor lyes!

Polishing makes the flooring last longer, of course. Colors will be reborn each time and the floor withstand wear better. Use a good floor wax. A home-made kind, if you can't buy any of the finest kinds on the market, can be made of beeswax and turpentine in equal parts. Use all the polishes sparingly and not more than once a month. Rub in well, however, when you are doing it.

It is well to have glass or metal caps on heavy furniture as narrow castors are prone to furrow.

For cork floors:

Sweep daily.

They must be washed with tepid water and weak soap.

Polishing is unnecessary.

Floors of tiles, etc., should be swept daily. Flush with warm water. Scrub once a week, strong soap and

elbow grease. Soda and water will remove stains. If not, use a weak hydrochloric acid or oxalic acid and wash off immediately with water and soap which will stop the further action of the acid on the tile. (One part of acid to two parts of water.)

Wooden floors also should be swept daily. Swab (don't scrub a varnished or painted floor) with warm water and weak soap. Keep hardwood floors free from grit, which bites and grays. Use a soft dry mop of felt or the brushes the reliable manufacturers make for the hardwood floors. Occasionally wipe off with some well known and tested floor finish.

To-day with rustless and ordinary steel the problem of cutlery is simpler and yet more diversified. In the case of cleaning and scouring ordinary steel you can use almost any good scouring powder, but not in the case of the stainless rustless variety, as it reduces the polish, the very thing that maintains imperviousness to rust and stain. Cutlery should be cleaned immediately after using.

Sharpening knives is best done by an expert. Yet there are good rotary sharpeners and stones and steels for home usefulness or knife destruction depending upon how they are used. Remember when you use a stone not to feel that you must cut through the stone itself and that what you are trying to do is to flatten the edge of the knife and wear off the offending bluntnesses. The ideal thing is once or twice a year to send the knives to a grinder and then occasionally at home run the knife blade flatly over a carborundum stone to get a smoother edge.

The stainless steel cutlery has a special kind of sharpening stone at present on the market and it is well to use this.

Good knives need no further edging when new.

But though you may have the best steel and the best sharpening, if you house your knives badly you will have lost all the good from these things that there is. It is not good for knives to be huddled together. They get as cutting as humans would in the same position. If they live in a small place together without their own places they, as people, wear on each other. They knick each other's blades and spoil each other's usefulness. Knives should be hung or laid in grooves. A box is now made for the proper housing of them. You can, too, hang each knife on a spring which you can get at a hardware shop. If you reserve a tenement house law for the knives of your household you will have real health and help from them.

The same story holds for forks. It would be a good thing to have a *verboten* sign in your kitchen, reading: "It is forbidden to open cans, uncork bottles, unlock oven doors, pry open ice chests, take a nail out of a box with the forks in this kitchen."

In the case of wooden handles, do not let them remain soaking in hot water for ages. Wash and clean them at once.

Floor Coverings

Floor coverings such as mattings and carpets are to-day best taken care of by the vacuum cleaner. Hot water cloths with a suspicion of ammonia laid on top of matting are supposed to be a good thing for its longevity after it is vacuumed.

Carpets are now coming back into being after years of retrogressive hate. Now on account of the vacuum cleaner they can be used in all their warmth and beauty and kept sanitary for ordinary uses by the vacuum cleaner. Talking of this:

The only thing that this instrument of redemption

needs is oiling, but not too often; an occasional dusting off; and the emptying of the dust over something that doesn't give it back.

Stoves of themselves don't get very dirty. It is the foods that are the transgressors. It is wisest to clean all stoves when cold. Use kerosene or stove black. In the case of the gas stove, when the gas vents become clogged by drippings of food it is well at least once a week to take them out and emerse in soda and water. Wipe off grease and grit before cleaning surface of stove and always remove dirt at once. If grease is removed after every using of the stove, it will be very easily maintained in cleanliness and it will never run away with you.

The trays under the burners in gas stoves should be cleaned often and well. Burners of oil stoves, too, can be immersed in soda and water. About one quart of water and one-quarter pound of soda make a good cleaning solution.

Some Miscellanies

Don't let any solid foods get into the sink. Always have a good sink strainer. Soda and water is a good cleaner. Flush sink with hot water and clean it at least three times a day. Grease is a forbidden quantity in a sink and should any get in, the hot water flushing will disintegrate it. Warm water and soap, fine powders such as whiting, etc., will keep porcelain sinks in good order.

Nickel can be cleaned with soap and water and polished with ungritty, well devised polishes. Never use anything that will scratch it.

Boil iron in soda and water, rub with some good powder with a bit of scratch in it. Use hot soap suds. Dry while it is hot.

Do not use soap on aluminum; there are regular aluminum cleaners on the market. Occasionally only use a little acid, such as lemon or tomato diluted. Never use soda.

Boil agate in soda water. Wash in hot soap suds and dry.

Use dilute oxalic acid for cleaning brass, fine powder, plenty of water. Polish with metal polish which abounds on the present market.

Tin can be cleaned with soda and water, but do not leave it in this solution long, as the alkali will eat the tin. Wash and dry at once or you will have rust on your tin ware.

The silver story is long but well known. The only thing not to do is to use gritty powders that will scratch. Wash your silver after cleaning, as the cleaning mixtures do not make good appetizers.

In caring for electric ironers and washing machines, first of all read the directions that come with them. Oil as they tell you or don't oil; too much oil is bad and too little is bad. Do not overload (with clothes) your cylinder or your drum; some motors rebel and there is trouble. When buying your washer be sure to tell the electrician what kind of electricity you consume, whether it is A C or D C; also the voltage of your circuit. This applies to all electric machinery.

Don't leave your electricity on when you are not using a device. If you do in the case of the iron, you will have fires and all kinds of trouble. Don't blame the machine for faults of your own. Remember in the case of the electrical ironer that heat is hot and that if you leave a piece of goods on the roll and the motor going you will burn your article.

These things are cleaned with warm water and polished and dusted in accordance with the ordinary metal

needs. There is little to say about their upkeep except what has been said about other devices. Follow the directions of the makers; they know the exigencies of their offspring.

Soft cloths and warm water are best for cleaning white wood enamel. Soaps yellow the enamel, so a few drops of ammonia added to a pail of water will help banish grease.

Warm water and soap or soda and warm water will clean off marble tops.

In the long life-assurance of metals generally, it must be born in mind that in order to keep them clean and bright things must be used that will not scratch, corrode or roughen—or at least do as little of these things as possible. In the case of silver cleaning the aluminum pan method is best because there is less corrosion and less roughening.

Rubbing with soft chamois and cloths after cleaning will give the metal the polish it often needs. Buffing and the use of pumice powders and pastes help along the better finishes. But these things all must be done in moderation to preserve the life of these metals. The more precious gold or silver must be treated of course with great care. Chemicals are dangerous and the best acids are lemon and those things which cannot poison. Many combinations are poisonous and must be used with discretion and the article well washed before using.

Were the space alloted for this story greater we could take up many more things, but space being the rarest of commodities we shall have to end with one last admonition:

When your devices do not work, as guaranteed, first look to yourself or assistant and see what is wrong. Then if you find you can absolve yourself from the great transgression—carelessness or ignorance—it will be time enough to attack the dealer and get redress.

CHAPTER XLIV

HOMEMADE ELECTRICITY

"WE have oil lamps, because there is no electricity in these parts." We hear this said in remote districts. Yet the danger due to lamps and hit or miss lighting could be so easily avoided by a small concentrated "joy machine"—namely, the electric lighting plant in its simple dimensions or great.

Good lighting has become as basic a demand as good eating. But there are some districts all over the world where there is no gas or electricity. So it comes to pass that a home electric plant is obtainable of which there are two kinds; that which uses the *storage* battery and that which uses but one *starting* battery. The storage battery has a voltage usually of 32, the other 110 volts. We are going to describe first, and at length the storage types—as these predominate. Afterward we will explain the "starting" battery type.

There are many homes in the country that only need lighting and enough electricity to run domestic appliances. However, it must not be forgotten that the plants for lighting and power are superb machines and simple, making easy the tasks of farm, ranch and dairy and the very large domestic establishment.

There is little need for the microscope when we analyse these plants; for whenever you buy one, it is well to be able to see what you are getting with the naked eye and take no chances on hidden anatomies.

These plants consist mainly of the fuel tank, which

usually holds kerosene or gasoline; the engine, the generator, and the storage battery. They are, briefly, small 32 volt electric plants of from 500 to 1500 watts capacity, which generate sufficient electricity to light 20 to 60 twenty-five watt lamps. However, think of the capacity of these machines in watts, because volts are not capacity but pressure. If you have a machine of 500 to 1000 watts (kilowatt) you will know that you can't use a number of lamps requiring much more than 1000 watts. It is merely a question of addition.

All these plants work very much on the same general principles. They all have the motor, the generator, the lubrication system, the batteries, etc., and vary only in types and varieties. One machine has one-fourth the number of moving parts of another; still another is more simple; one has a certain battery control and another another, and so it goes. Some are water cooled, some are air cooled.

Above all, in these machines, their component parts should be an open story. They should be as simple as possible without a lot of fixings to blot out comfort. If you need a plant only to make light for you and power for home appliances, one of the smaller plants will do. If you have a home in which you are using household electric devices get a machine large enough to make the amount of electricity you will need. If you have electrical farm machinery, get the machine that will take care of the present load and a little more, so that you will be able to let your efforts grow and be cared for adequately by your plant. This is good advice when buying machinery for any home or farm. Always tell the dealer exactly what you need and why and he will advise you wisely—if you have been careful in your choice of dealers.

If you own the storage battery type of plant, you need

run it but two or three times a week, because you will enjoy the electricity stored in the batteries between times. However, it is advisable, when using an iron or other devices with heating elements, to start the electric plant because these things use the equivalent of twenty lamps and therefore reduce the stored electricity too quickly; "at one fell swoop," as it were!

Some of these plants come with a capacity of about 2500 watts, so that there is really no farm nor home that cannot be made comfortable with electricity, if it is really wanted, and there can be no place too remote, to have the exquisite joy of mechanical power instead of the leg-and-arm power that becomes tiresome on a day by day basis. It is possible that these labor saving plants have given more pleasure and comfort where they are used than any other one thing.

These same power and light plants, let it be said, in passing, will run the electric motor, used to pump water. Thus, nearness to town or city need not be the condition of electric comfort of any kind. This applies only to localities not supplied with central station service. One of the smaller machines weighs 125 pounds exclusive of the batteries and wiring. Its lightness does not mean that it is better than any other plant on the market, only that you can move it about, which is rarely necessary. This portable outfit can be put in the back of your motor, if you want to use the same plant for the boat that you use for the bungalow. Furthermore, if you mean to go camping, this same plant can be uprooted and taken along. It contains nothing much to get out of order, as there are no valves to grind, no carburetor to cause ructions, no gears to get out of gear, no push rod to presume, and what is among the finest quality of this type of machine is that its fuel consumption is very low—to say naught of its low initial cost.

The smaller types are not imitations of great plants, but are plants made and designed for their own special scope and, being in no way substitutes, do their work beyond reproach.

Another feature of some of the plants is that they are automatic. All that has to be done when and after the plant is installed is wiring, filling the tank with fuel, adjusting the intake as per directions, then using your lights and enjoying life.

The batteries are charged and ready to use when installed and when the batteries get low, and it is necessary to recharge, simply press a button, as you do to start your automobile, and the motor will run until the batteries are fully charged, then automatically stop. No engineer is necessary. Anyone can have these plants anywhere, and enjoy the blossoms of light and power. All you need do is to keep them stocked with fuel.

The cost of electric light per lamp is about one cent per day. Oil is no cheaper. However it is always dangerous to give costs, for everyone has a different way with machinery. It has been computed by some users of these plants that lighting costs less than one-quarter as much with them as with oil lamps. It often takes less kerosene for fuel for these plants than it takes to replenish lamps with oil.

Some of these plants are so simple that there is no carburetor, no belts, no cranking, no water to carry, and only one place to lubricate. You will find that many people know not of the existence of these plants—even electrically trained folk—so don't give up the ship in your cruise for comfort.

Most of the machines work on gasoline or kerosene, which makes the electricity inexpensive. In the best there is no cranking—a button or lever to press and that is all.

There is another type of electric plant that does not use the storage battery system. This has a starting battery of 24 volts only and the rest of the machine does the job. This type of machine is beautifully made and fills the need of the home delightfully. There is an automatic switch for starting the engine and standard lamps and devices can be used with comfort. With this type of machine, the engine must be in use continually as there is no way of storing electricity while the engine is resting.

All these machines, with and without storage batteries, have efficient governors, which provide easy transition from light to heavy and from heavy to light loads. Appliances made for 110 volts can be used in connection with these machines.

All you have to do is push a lever or press a button and your electric power house starts to function. This button is usually in the control panel near the machine. The power from the storage battery starts your engine just as does the battery in your motor car engine, when you push the starter with your foot.

So your electricity becomes as simple to use as drawing up water from a storage tank. If you take from the battery, you have to re-charge it. Then when the battery is well charged, you can use the electricity output of both battery and generator and thus have more electricity than you would have on either battery or generator alone.

On the battery there is usually a device which indicates the charge, so that guess work is again eliminated and with it the strain of uncertainty.

Suffice to say that the generator and all parts should be well fashioned and made by a firm of great integrity. Never buy a lighting and power plant until you know the forbears and ancestral beginnings of that plant.

CHAPTER XLV

THE ABDICATION OF KING COAL

I

THERE never was a time more suited than this to retailing the merits of the oil burner. It is no pretender to the throne of King Coal, but it is becoming the regent.

For our purposes it is not necessary to know every screw and valve in the discussion of what constitutes the oil burner. All that we need to know is that the burner is a device which burns oil (in our own furnace, if it is efficient, or in a new furnace) instead of coal or wood; and that most of these burners can be used with hot air, steam or hot water installations; and that there are variations in type.

The outfit usually consists of a storage tank for oil, pipes from the tank to the oil vent, motor, ignition system, burner and blower. The oil is usually a kerosene or some distillate oil needing no pre-heating such as industrial oil burners demand. The oil passes from the tank through the burner and is atomized (finely sprayed) in order to mix the air's oxygen with the oil for perfect combustion. Thus, when ignited, the oil burns up completely. The oil usually is ignited by an electric spark, or gas pilot—a combination of both or by hand in the usual gravity feed types.

Special Types

There are two different types of burners—the high grade electric motor driven burner (1), and the gravity feed burner (2). In the first, the air and oil are thoroughly mixed and forced into a chamber, being automatically sparked (electrically) in some such way as is effected in the automobile. The usual inexpensive gravity burner is prone to go out, often is odorous and smoky. It is not automatically ignited and so is not the comfort that the electric type is. The oil tank is usually two to four feet above the burner, affording a certain amount of pressure to force the oil into the burner.

Now, of course, every manufacturer has made his device with special features; hence, although most of the good burners passed by the National Board of Fire Underwriters Laboratories are efficient, yet they have various means of arriving at efficiency. So we find that most are electrically driven, some fed by gravity (where there is no electricity) or by water power; others equipped variously with fan, pump, air compressors or blowers. Then, too, the oil is fed by various means, gravity, vacuum or rotary pumps, and so it goes.

First and foremost in our argument for the oil burner is the fact that it is the acme and quintessence of comfort. Fancy a furnace needing no stoking, requiring no nocturnal and matutinal tours to the cellar! Fancy, too, the cellar—dustless, binless, ash-less! A cellar in which to play billiards, or hand ball—even to have a study, as we know of in one case, where the oil burner is installed. Then, too, there is no cartage of ashes, no scuttling with scuttles, and a cessation of coal dust through the home. The furnace man becomes obsolete and your independence is a gain in itself. In fact, we

could become lyric over the romance of comfort in the use of the oil burner.

Features and Controls

The thermostat attached to the device, with its running mate upstairs, keeps the temperature even, for the burner ceases to operate when the house is warm enough and as the house cools down it starts its merry roundelay again. So you can be sure of no oil wastage. Then, too, the burners are fitted with all imaginable safety devices to control cut-offs for gas, oil and electricity,—which make them danger proof.

As to noise in operation? This question we are always asked. There is a hum caused by the motor and atomization under pressure of the oil. There isn't really a noise that annoys. This hum ranges from the amount given off by an electric fan, which cannot be heard many feet away, to a hum that can be heard a floor above the furnace. So the noise of these comforts is not a considerable factor. Of course, there may be some old models more aggressive than the new ones. Then again noise in machinery is often due to lack of care. All oil cups in these devices must be kept replenished or you will get undue friction which may not only cause noise, but wear. But this is a point to be considered in everything from the typewriter to the ocean liner's turbine. These oil burners are simple, compact and take no more than about two or three feet of lineal space outside of the furnace proper.

Before purchasing an oil burner, be sure that it has been tested by the National Board of Fire Underwriters. This organization tests them for safety, surety and efficiency. If passed by them after their long period tests, you know that all is well that begins so well. Then find

out some one who uses an oil burner and get from him or her the opinion born of intimacy. In short, buy the oil burner with as much thought, imagination and respect as you do your motor or radio set.

Purchase and Care

There are hundreds of burners on the market, some good, some bad and some indifferent, as is always the case. So, a sensible choice has to be made. The variations in methods of oil feed, structure of fire box and other variations as well, are many, and only experience and thought will assist you in purchase.

Another thing you must ascertain before buying is the supply and servicing of oil in your vicinity—its availability, quantity and quality. Of course, the dealer or manufacturer will do most of this research for you.

If you are getting an electrically driven burner, you must know what sort of electricity (direct current or alternating current) you have in order to have the motor conform and save the time and expense of changing or re-ordering.

Briefly, then, it would be well to think over the following ideas:

See that your chimney flues are cleaned out and the drafts are open before installing the burner.

Have the company installing your burner give it an examination before each winter's session.

Do not let ignorant folk experiment with the simple device any more than you would with your automobile.

Keep the machinery well oiled and cleaned.

Don't permit oil rags to litter your cellar floor; permit no oil drippings.

Take all the common-sense care of this machine that you would of any other.

If your furnace has never been able to heat properly with coal, get another. No oil burner will be efficient in a bad installation of flues, drafts and furnaces. If your house is so cantankerous as to needs, tell the oil burner dealer, for a cranky house is often the best heater's downfall.

A light haze only should emanate from the chimney, if the oil is being consumed properly. When the oil isn't properly consumed, you may have odor. Remember this.

If possible, periodic tours of service should be made by dealer or maker.

Plan for a large oil tank outside and an auxiliary of about 60 gallons. This varies, of course. Consult the maker of the burner on tank usage.

Certain adjustment and readjustment on new machinery need never scare you.

See that control of flame and all operating parts is simple, easy or automatic.

Take into consideration the various noise eliminating, ease conveying safety devices, oil burning and other features when comparing one burner with another. Each one has its own fine point. Take your choice plus other folks' experience.

Always ask a user about repairs, even though on these machines the upkeep is nil.

Get a guaranty of service for a year.

Variable Costs

The apparatus varies in cost. It is unwise to quote prices, so we shall not save to say they vary "to purse." The devices are made sometimes in various sizes but most manufacturers make one domestic size only. Many are sold on part time payments.

But cost is no factor here in fuel saving—comfort is

the main consideration in home heating. The lack of effort, the added cleanliness, the clean, dustless fuel—the sort of ease and finish given to the home with the oil burner are more than the saving of 25% in some cases or the added 10% under other conditions. The super-comfort is the freedom from the coal strike, which assures heat even when there is no coal. Such values as these are beyond computation.

Question of Safety

As far as safety goes, the burners are as safe as anything that uses fire. Enough said. And as long as you keep the laws of your vicinity in the storage of the oil, and its legal uses, there is just as much safety as in any other heat purveyor.

Of course, you must remember that familiarity breeds content with machinery. You never know a person until you live with that person, so you never know a mechanical device until it lives with you.

There is nothing complicated about the oil burner. It has been used for years in industry but only lately has an oil which does not need preheating been distilled for domestic use. Should it have to be preheated, as in the factory, it would entail an engineer and all the other discomforts. The lighter oil has solved the question of domestic oil burning comfort and the coal strikes have given impetus to the manufacturers who have been benefiting wise folks' homes with these burners.

II

The two chief gains in the oil heater over the beginning of the last decade can be recorded under two heads: Experience gains and mechanical gains. To be

sure, the mechanical is the result of experience, but by experience in this case is meant those gains realized through usage; and by mechanical gains, those intrinsic things which were done toward the simplifying of standard equipments themselves.

Let us first examine the mechanical gain. First, there has been a great advance in the establishing of reliability throughout the machines of best make by means of amplification and fine assembling of parts. When you consider that an oil burner goes on and off some 2,000 times a year it evidently must be so made and integrated that not one of its parts fails in performance. This result has been attained.

Secondly, at the birth of these heaters they were not able to consume the heavier and cheaper oils, and at present many of the heaters can adjust themselves to any domestic fuel beverage served. This makes their operation feasible in districts where but one brand of domestic fuel of oil is on sale.

In the third place, the anti-syphon device prevents oil overflow from tank into cellar or furnace. This obviates the ancient oil puddles which not only defaced the room's floor but were not any too safe.

Again, the clever and simple safety devices of yesterday and today in reference to steam pressures and positive boiler control do not only banish danger, but result in economic operation. The motors are built for efficiency, too, and yet the silent mark is also their aim.

Improvements

At present the oil heater is used, without extra installations, for the heating of steam and water systems under certain circumstances. The heaters using fire pots have been decidedly improved, are more lasting,

and the linings are easily replaced; and those without fire pots have improved the bricking of the furnace combustion chambers, in order that longevity be added to efficiency.

There are oil burners now for every home condition and for large as well as small ranges of radiation, and automatic control at present applies to water heating as well as to house heating. Brass pipe (generally) throughout and liberal use of bronze and aluminum in its make-up have added greatly to the mechanism's durability and long life.

Leaving the mechanical end, at which the engineer is always at work to improve this home benefactor, we come to the gains on the experience side.

The greatest advance here is in the training of men on installation problems and service, so that they know intimately and well all the fine points which add to the efficiency of the oil burner.

It has been learned that no oil burner (and we would include many other mechanical devices) is better than the hand of the man who installs it. Today, the construction of a house, the habits of the dwellers therein, the conditions of the heating plant already on the premises, its efficiency and drawbacks are studied. It is acknowledged that one burner will do for one house when it will not do for another.

For Proper Heating

The over-enthusiastic user of one size burner used to tell a friend how amazing it was, and the friend would order a machine which was far from what he needed. Today, the right manufacturer or dealer must be supplied with data in regard to your house, its construction

and the installed radiation. It is easy to see why a good concern insists upon having the facts.

For example, noise is one of the things about the oil burner which has dimmed its glory. At present the best oil burners are almost noiseless, and have but the faintest hum. Yet one of these heaters in one house may make a thunderous roar, while in another it may be as quiet as a spinning top. This is due to the way a house is built in regard to conditions which act as sounding boards and sound conductors. Therefore the installer must be given all the facts concerning these conditions, so that they may be given due consideration at the time of installation. Noise, of course, has been lessened by more silent motors and other engineering expediencies. Furthermore, your heating plant, flues and chimneys in every particular must be in good condition, whether you use oil or any other fuel, if you want the most satisfactory results. It is wisest in using any fuel whatever to use a separate flue for the furnace. Particularly is this best in the case of the oil heater, for often the flue running close to and touching another flue passing in close proximity to hearth and registers intensifies the slightest hum of an oil heater to annoying dimensions.

Heating problems are studied in the laboratory as well as in the home. Institutions are making a study of the subject which leads to oil comfort and economy. Automatic control has gone so far that a turn of the wrist given to the thermostat upstairs is all that need be done, save keep the oil tank full, the boiler "watered" and the machine itself well lubricated.

Every machine has different talking points. One dealer speaks of the adjustable flame which changes its shape to fit a round or rectangular furnace chamber; another speaks of atomization done by direct pump pressure; another, of atomization by a mechanical

process, and of preheating by the hot gases before final combustion; another is atomized by centrifugal force, assisted by a fanned air current and is vaporized and burned in suspension. In a fourth type the atomization is done through use of a rotary plate, and so on through baffling variations.

Ignition is achieved in various ways: by expanding gas pilot, by electric gas and by electricity alone. Some machines are completely automatic, some can be automatic, semi-automatic or manual. The oil feed varies, too; among the methods which obtain are pump and gravity. Thus in every one of the first-rate oil burners are there not only differences in the parts mentioned but in every other part.

Choosing the Oil Heater

An advance has been made, too, in the way to choose. An oil burner ten years ago was bought and installed for one house or another considering only the oil burner. But now, in order to choose, you must consider your home, its needs, its locality, and before buying you must be absolutely sure that you are buying what the reliable dealer guarantees for your use. You must find out whether the manufacturer and dealer are financially sound and whether they are going to stay in business and are not what may be called "fly-by-nighters." Then investigate to discover whether the oil heater you contemplate has been listed by the Underwriters Laboratory; some department like the Board of Standard Appeals of New York, or the Public Safety Department of Massachusetts. If it has not had this sort of approval, look for another oil heater. Get a guaranty from your dealer for a certain period of servicing and reliability of operation, and insist that the manufacturer or dealer

installs the equipment. Find out if they install as well as they talk up their product. If they do not, get another heater from a concern which understands and sells installation.

Don't buy an oil heater, if you are in danger of not being conveniently serviced with oil. Today, however, the advance in oil service has been so tremendous that there is little or no territory not served comfortably. Not only must the oil man serve oil but he must have the proper grade for your heater. That is one reason why heaters capable of using the various grades for residences are far in advance of the more restricted types of ten years ago. There has been an increase in the number of grades of oil in the past years. Furnace oil, a distinctive domestic oil, as well as other distillates has resulted.

If the installer does not make a careful examination of your heating plant, he is evidently desirous of selling a heater rather than of giving service. So you should then change your dealer.

It has been found, too, that the tank is best installed outside of the house and buried. Furthermore, never cover it with cinders, as a corrosive is formed with moisture which creates leaks. At the time of installation see that the fill-pipe is on the roadway or walk or gutter so that the trucks need not spoil your lawn, and also that carting receptacles to and from fill-pipe to tank wagon does not despoil the lawn as well as increase the cost of oil in your case. The indoor tank is too small, and entails serving from the house and consequently the higher cost of oil, which has to be bought in smaller quantities.

Another advance in oil heating machinery is the fact that salesmen no longer talk initial cost. The subject of upkeep is exactly where it was before. The truth

is that in oil heating, cost is more often saved in labor than in fuel. To explain: In many installations the cost of oil exceeds that of coal. In some vicinities servicing makes the cost of oil more or less than coal. Some homes are so built that the heating system never did heat the house properly and when adequate oil machinery is attached to poor equipment and comfort is finally obtained (naturally at a loss of boiler efficiency) the present cost of fuel mounts higher than the past cost of coal bills. But if you could get the even, continued heat from a coal installation that you get from the oil installation (of best type) the coal system may cost more than the oil. To be sure, often there is a saving in fuel cost when oil is used.

In Conclusion

There is now no reliable Ford of oil burners. Therefore buy a heater not for price but for promise of values. In a very low priced heater you get inferior metal, uncertain manufacturers, insecure engineering, future replacement costs, and undue servicing. In the higher priced heater you get experience crystallized into excellent engineering, future stability and little or no servicing.

So far have the oil heaters gone in the confidence of man and government that insurance is not interfered with in the least, if the machines have been listed by the agencies already mentioned. If there are no local ordinances in your town to follow, by all means get the regulations covering oil burning heaters from the National Fire Protective Association, Boston. Then you will have sufficient criteria for safe purchases, and you will have a happy issue out of all your past house heating troubles.

As a final thought, don't expect miracles. The oil

heater is a wonderful invention but it cannot heat a house so badly constructed that it cannot be heated. It cannot efficiently heat a house unless it is installed correctly. It cannot heat a house if the radiation hasn't been correctly computed, nor can it be installed correctly unless the consumer permits the maker or dealer to know all the facts surrounding the heating and construction of his particular house.

CHAPTER XLVI

HOT AIR

ONE of the strangest things about us is that we do much talking about how public buildings should be built, ventilated and heated, and yet with no thought whatever we sometimes build our homes, in which we live constantly, and accept anybody's or nobody's advice as to what to install in the way of heating plants and other equipment which may add to or detract from the bill of health.

In this tale we are going to discuss the warm air heating plant—not to win you over to it, but simply to outline it in its best forms, for probably no apparatus for home use has endured more from an incompetent past than has warm air heating. At present, and for some twenty years, the best designs have been disseminated by the rank and file of manufacturers and conditions are excellent. So let its past be forgotten, for according to users and makers the warm air heater is now a heater for the whole house rather than for a favorite room and adds to the proper ventilation and humidification of the home.

Concerning the Pipeless

Before we go further, let us not give you the idea that we are talking of the pipeless heater (also a warm air device), which we do not advocate for general use, but only special ones. With it, all the room doors must

be kept open on the central hall or halls, or they will not get heat. Should there be illness of an infectious type in one room, the disease would spread over the house. Furthermore, rooms should not forfeit their privacy even to be heated, and with the pipeless heater, this renunciation is the primary condition of heat comfort. We should rather be cold than to have to keep the doors of our room open!

So back we turn to legitimate warm air heating, for whether we like it or not, it is being used, and as faithful stewards and intelligent homekeepers we must know what it is.

The principle of warm air heating is that of convection and a combination of methods involved in all heating processes. Air is drawn in and is heated by coming into contact with hot metal surfaces. In the best apparatus, the cold air is taken in, not through one pipe and heated *en masse,* but passes through a number of pipes surrounding the heat chamber of the furnace, in which it is thoroughly heated, resulting in small streams of air which are passed up through separate heat ducts to the various rooms, where the heat emerges warm and moistened from the register in the wall or floor.

Heat Without Radiators

One of the advantages of this system of heating is the obviation of the radiator which usually takes up room. At this point we stop to say that we are far from condemning our good and loyal radiators, for to their systems can be added ventilators and humidifiers too, giving one all the comforts of the American home.

In the old days, when warm air heating was used with badly designed systems, the chairs often used to take it upon themselves to fall to pieces from the over-dried

air in which they lived. Throats used to get dry from the same reason and the silver used to tarnish from the fruits of fuel combustion. At present, means are taken to avoid these faults and the air reaches the room unsullied and improved. Of course other heating plants keep up the "dry" habit too and need humidifying devices as well as the warm air heating equipments. It is the need of humidifying devices and dry air heat that makes our imported antique furniture fall apart.

The best furnaces supply an even distribution of warm air throughout the house, dependent on the scientific proportioning of the various warm air discharge pipes and the cold air leads. Furthermore, the pipe and heating conditions always involve a consideration of the glass surfaces in the special home which is to be heated; as well as the amount of exposed wall surface; air leakage around doors and windows; and the amount of exposure to wind and weather to which the house may be subjected. However, every room can be kept warm as the heat currents have special air ducts to each.

These equipments include a humidifier, which keeps the air in condition. We are prone to insist upon heating plants of public buildings purveying air to us with the proper amount of moisture and in a well ventilated manner, but usually forget that the air of the home needs the same nursing. We should have at least from forty to sixty-five percent of relative humidity in the air to keep us healthy. In winter, we often need more heat than would be necessary if the relative humidity were as high as it should be. We are cold in winter with too low relative humidity as we are hot in summer, when the relative humidity is too high. So, in the winter you can save fuel if you have some way of adding the proper moisture, for health and comfort, to the air of your house. However, it is not possible to have as high a

degree of humidity in the winter as it is in the ordinary summer temperature, due to the fact that condensation will take place on the window panes, etc., to such an extent as to cause trouble. This is true if the humidity is over 50% in severe winter weather. The humidifiers attached to these systems of heating work so well that they need little or no extra care. On warm days, the humidifier has little moisture, and on cold days, the proper amount also. Therefore, this addition to the heating plant conditions the air, keeping it moist and in normal circulation, so that colds, sore throats and membranous irritations occur less frequently.

In addition to the humidifier on some equipments is found the usual thermostat which lowers and raises the drafts and obviates the necessity of repeated trips to the cellar and the house is heated and is kept warm without wasting fuel.

As with all heating plants, there is also installed the water attachment to insure hot water.

Some of the ventilating systems are so efficient that the air is changed from three to five times every hour. This is done by a series of vents. These vents are usually put on the wall near the floor or on the floor and the registers put close to the ceiling on the wall. All homes do not need special ventilating systems, although many may. (See Chapter LIV.)

Fresh Air

In most States the law (about 20 years old) ordains that every school child shall have thirty cubic feet of fresh air per minute. Besides this it has been found that air must, besides being fresh, be kept in motion. Why should not homes, too, have proper aeration? By proper we mean air in motion as well as fresh air, which

is obtained in homes from the air leakage often without ventilation devices. The ventilating system with this warm air heating equipment aims to keep the air in motion as well as fresh.

There is no doubt that many a death is caused by illness which would not have been had it not been for bad air conditions. The ventilation and heating of houses will soon be so indissolubly joined that you will never think of installing a heating plant, whatever it may be, without proper ventilation systems, weather strippings and house insulations. These things—all but the furnace—have been considered as structural "caviar," and unnecessary, but soon it will be proven that without such assets, too much health and too much wealth are needlessly squandered.

Haphazard airings of the house by flinging wide the doors and windows waste fuel and cause drafts which breed colds and other ills. The forward-looking home-keeper and economist will, when building or when installing any type of heating plant, think of health and wealth and comfort in terms of proper ventilation and air conditioning. This must apply not only to warm air systems but to the popular and efficient hot water and steam systems.

Heat in Short Order

If the warm air system you install lives up to what the best makers claim for it, it will be found to be easily managed and swift to respond to demands upon it. It is flexible, for you do not have to wait for steam to be generated to thermal altitudes nor for water to rise to around 180° Fahrenheit. The moment you light your furnace, the air begins to circulate, for it is the habit of air to circulate when heated, and the house begins to

warm up. So with the lighting of the fire, the house soon begins to feel warmer. This system is under control at all times, because of its direct and positive action. In cold weather when the rooms cool off, the temperature can easily be raised by merely opening the drafts. The thermostat enters here and automatically takes care of these things for you.

However, no matter how fine a heating plant of any description or type you may have, your chimneys must be in perfect order. No furnace will function without having its "lungs" in flawless condition.

There are two types of warm air heaters: the blower, or fan type, and the one called the gravity type, which has no fan or blower to spread the circulating air. In the small residence the gravity or blowerless type is used. Often, however, blowers or fans are added to send warm air to rooms which are in far distant wings and which are therefore difficult to heat.

But, in one of the best types of warm air heaters, tubes, through which the cold air passes to be heated, can be commandeered for a difficult room and the heat carried there without any blower at all. In this case there is no need to hug a register in one favored room because another is untenantable.

In the best warm air systems, the fruits of combustion which used to tarnish the silver and offend our olfactory nerves are taken care of by a system which provides for the carrying out of the gases through the chimney and not through the roof. Furthermore, the furnace should be so built that all heat generated passes to the rooms to be warmed and sent into the cellar, for the outer casing of the first-class furnace is not a direct contact with the fuel chamber, but is separated from it by a series of air tubes and asbestos insulation.

However, the best system of warm air heating or any

other heating will fail unless the installation is made by consummate experts. Therefore, we approve of having the installation made by the manufacturers themselves, whenever possible.

We would never, should a doctor tell us that we had diphtheria, ask him to cure us for typhoid. Yet many people, installing a heating plant, insist upon the registers or radiators being placed in certain spots. When this cannot be done, they leave the efficient doctor of engineering and go to another who is willing to assuage their feelings, and the result is inadequate heating during the major part of the year in which it is necessary to have heat. Therefore, we urge you to go to the very best "doctor" who will give you the best advice, even though he is more expensive than another, and even though he stands a chance of losing you as a patient. This cannot be over-emphasized, for most of the bad heating is due to the temperamental buyer who does not accredit the heating engineer with the proper amount of thermal understanding.

In some houses where there is a service wing in which the servitors live, move and have their being, it has often been found convenient to heat this wing with steam and the masters' wing with warm air. Thus, the steam heat can be left on all the time and when the master leaves the house, the warm air furnace can be turned off and turned on again with ease and dispatch.

If you go to the proper warm air system engineer, he will be swift to tell you whether your house is adapted to the warm air system.

A Combination System

Another type of warm air heater combines hot water heating and hot air. With these are used radiators for

remote rooms to insure heating, and in all other places, the register is used. Sometimes, too, a steam furnace is combined with the warm air and in this case a separate furnace is used so that outdoor porches enclosed in glass and other such chambers can be well heated, especially those rooms which are over an unexcavated piece of ground; for with no cellar and suitable partitioning, the air ducts cannot be put in.

The double system of hot air and hot water keeps the air in good circulation, yet any of these systems, if intelligently applied and installed in the house adapted to it, works admirably.

In the making over of small or old-fashioned homes, all things being suitable, the hot air system can be put in with less marring of the ancient architectural scheme, for the register takes the place of the radiator, a modern accomplishment with a too modern flavor, while the register is not a modern appliance and takes up no floor room.

Many a tale has been heard through the register in the olden days! But now, as each room has its own air duct, this gossip source has vanished and thousands of homes, schools and public buildings have comfort and privacy.

The fuels used in these furnaces are usually wood and coal. Only in some instances may oil burners be advantageously utilized.

The right sort of warm air heating system is no cheaper than any other installation, but it is claimed to be a healthy and normal method, insuring a saving in health-maintenance costs. Some of the advantages claimed for warm air heating are the following: Ventilation, humidification and heat are supplied all at once; heat and moisture automatically furnished preserve the health of furniture and folk; they heat any room, no matter

how the wind blows; they use less fuel than steam or hot water systems; registers and not radiators are used; fresh air is continually being brought into the house and heated; and large quantities of air are warmed but never superheated.

Registers must be placed according to the advice of your heating firm.

CHAPTER XLVII

Softening Hard Water

DUE to its globe trotting in the underworld, water takes up more or less mineral matter. It may look clear and taste well enough and yet contain lime, or magnesia or some such mineral. In other words, you will be drinking and washing and cooking with a mineral water, which has various and sundry bad effects.

In some vicinities water is harder than in other vicinities. For example, in regions where there is mud, stubble, lime and magnesia and less of the harder minerals, the water will be harder than where the rocks through which it flows are of more "Spartan stuff." Wherever there is mineral matter which succumbs to the soluble powers of water, we have water of some degree of hardness.

Under some conditions it doesn't matter if there is a slight degree of hardness (which usually exists), but under other conditions it is quite perilous to have water with any degree of hardness.

Until recently, it was very difficult to break up the union which takes place between the solvent water and ready-to-be-attached mineral matter, but now we have, due to science, a method by which any water can be made soft for personal, culinary, and industrial uses.

In many sections of the country, people have taken to using rain water because it is soft. They feel that soft water is better for the skin, for the shampoo, for

æons and causes useless gas expenditure for the next re-heating.

3. The Automatic Instantaneous Heater:
   This, it seems to me, fills the need of hot water more simply, swiftly and expeditiously than any other. Especially for the homes having from one to three bathrooms. Therefore I want to explain this device rather fully.

Now that it is invented, it is very simple indeed and consists, briefly, of a casing enclosing a series of copper coils. The other principal parts are: the water entry pipe, a beautifully adjusted valve which is opened and closed by the flowing of the water as the faucet is turned on or off, a pilot light, a carefully contrived set of burners, a thermostat and the connection between the heater and the house water system.

As the water flows by turning on one or more faucets in any room in the house the valve is opened and releases the gas which is ignited by the always functioning pilot light. As the water flows through the coil it becomes heated. The thermostat stands guard and when the water rises to 140° Fahrenheit it shuts off the gas. Here is fuel conservation! No gas is used when it is not needed.

Every effective automatic instantaneous heater works on the same principle. There are three or four excellent ones to be had and they only differ in tiny details, which of course are thought excellent by the manufacturers, but which alter in no way their excellent operation. For example, one firm builds the series of inverted copper cone-like coils in a sectional way so that the cones which are in constant contact with the gas flame can be easily taken out and renewed; some of the casings are finished differently than others on the inside; some have extra packing in the burners, another lines its casing with as-

composition of chemical life was born the modern domestic and industrial water softener.

As the domestic softener is simple, we will describe it and then pass on to its "power for good." It chiefly consists of a cylinder with the natural or artificial zeolite in it; two pipes, one of which lets the water in and one which lets the water out; a valve which permits salt to be dropped in. In order to re-use the zeolite (after it has exchanged so glibly its mate for the mineral mate in the water) it has to be restored with sodium again to be useful, so salt (which is chlorine plus sodium) gets busy and remarries the zeolite to its original mate sodium and the zeolite is again ready to make the exchange with the water and its lime or magnesia mate. Thus each week, the Reverend Salt performs this marriage, then the divorce follows and, in true fashionable progression, these marital storms and calms take place one after another, making of the cellar a place of social distinction indeed, if marital change makes for this coveted state.

The main water supply, of whatever hardness it is, passes through the main pipe as it enters the house, then it goes into the water softener and, without extra chemical pumping or furbelows, flows through your faucets as soft water. It is simplicity itself.

Probably more water is used in the kitchen and laundry than in any other place in the home. It is here that our foods are cooked and our clothes are rendered usable after they are soiled. Therefore much soap and plumbing are used in these two departments. When you use soap with hard water, a soap curd is formed and you waste the soap, your temper and your time trying to make a lather. If your water is softened on its entrance to your home, you will save 50% of your soap bill, to

say nothing of your hands which we will discuss further on.

Beside the soap waste, you will have to scrape out your kettles because of the lime stone lining that it forms, and you will have to scrape out your boiler, for even when you have the most modern installation of pipes and plumbing you will have no comfort if they become clogged with solid lime or whatever your "promiscuous" water supply has attached unto itself.

So not only in the kitchen itself but throughout your whole house you will save many a plumbing bill by the fact that your water softener in your cellar is carrying on its marital exchange with the least possible expense and no noise. In fact our own divorce courts would do well to pattern themselves upon this quiet and courteous exchange of hostilities and amicabilities.

We have seen pipes in which, due to hard water, one eighth of their space was lined skillfully with solid stone! Many a time your plumber and plumbing has been blamed for this—because you didn't get enough water! Oh friends! Oh Domiologists! Look further than your pipes or pans, look into water itself which runs into your house, find out its constituency and then talk to a water expert.

Even if you should enjoy paving your pipes, remember that cookery itself is improved a millionfold by soft water. It is amusing to know that the reason why Boston has elevated the bean to aristocracy is basically because of its supply of soft water!

In the West the bean is merely ammunition and used only in bean blowers and in bean bags! As a food it is null and void, for those folk who know not the magic of soft water still look on the bean as a hard proposition whereas it is the water that is the hard proposition. Yet with small expense (the softeners cost from $200 up-

ward and the needed salt about 2 to 3 cents a day) they could revel in the bean and meet Boston on its own high water mark! In some advertisements very familiar to us all, the manufacturer of a brand of canned baked beans always mentions the fact that his baked beans are cooked in water that is divorced of all unnecessary matter. I happen to know that he uses a zeolite water softener.

Batiker makers will have much better results with dyes and with the fabric conditions if the water is soft, because all textile and silk and dyeing factories use the softener to make water absolutely soft or zero.

Vegetables cooked in hard water absorb the mineral matter in solution and if you like to have your insides become a lime mine, use your hard water. Anyhow if you like to keep "up" on fine cookery, here is one way to have your family say, "How tender these peas are!" Buy the finest vegetables and cook them according to the best authority, and yet you cannot beat the ravages of hard water on their delicate tissues and still have an epicurean result.

Furthermore to a slight degree the color of vegetables deteriorates in water that is hard, so why handicap your work by poor materials?

Linens

Now for the laundry. A very large hotel system—and this will seem incredible—decided to try an experiment and find out whether soft or hard water had the best effect on the durability of linens, napery, blankets, etc. After a period of one year, experimenting with water softeners, and the gathering up of data and comparisons in about ten of its hotels, it was found they had saved, by the use of the softeners, 33 1/3% of repurchase cost

for household linens, napery, bed clothes, etc., etc. Why? Simply this: The soft water carried no mineral to form soap curds that clog the fibres of the fabric, which when ironed actually bake into hardness, and of course, wherever the material is folded the stone (formerly the soap curd) battles against the insult and for its humiliation breaks through as would a spear, the fibre of the fabric. Thus you can see how the longevity of a piece of linen or silk or any fabric depends on the way it is washed and, as water is the main solvent not only in the home but in industry and in the laboratory, the moral is certainly: She who uses hard water is lost, but she who uses soft water is fortunate.

Some people wonder why their linen cracks and why their blankets are so hard and unfluffy after washing. Many times, of course, not always, hard water is the basic cause. So it behooves you to find out a thing or two about your water supply. Doesn't it?

Saving Your Skins

The use of soft water is not only an economy in saving, plumbing and kettle costs and waste in bad cookery, it is also a saving in health as well.

When you wash in hard water and use soap, the soap curd forms and stops up the pores. Now you know when the pores are clogged up part of the bodily vents are closed, the waste material cannot get out and you may become ill in some way or another. The classic example of disaster to the pores is found in the story of the page in Florence, we think, in the times of the glory of Dukes of Tuscany. There was to be a great religious glorification and to this end a little boy was gilded from head to toe to imitate an angel. Shortly afterward the child died because of the stopping up of his pores with

mineral matter. Of course, this is not so drastically the case with hard water, yet you will get the point that if clogging all the pores lead to death, a slight clogging will leave ill effects, probably ugly skin and a bad complexion.

Cosmetics help the skin but hard water acts as a retardant to the best of cosmetics.

To bathe babies in hard water would be to start them badly, because their sensitive skins should be treated with best materials.

There is no doubt that soft water in the shaving process as well as in the laving of the face makes the face feel better and look better. The fact is that plenty of the facial upheavals, pimples and blackheads, are due to the clogging of the pores. Why then do you want to plaster over the vent holes in your skin to make an ugly world uglier? For there are few things so ingratiating in man, woman or child than pleasant-to-behold skins! And as for the roughened hand . . .! All the rubber gloves and salves and lotions cannot make up for the inconvenience of hard water coming into the house and coating it with discomfort.

You know, we feel sure, that the refrigeration which is done without ice is due to the process of evaporation. You know that when you feel water leaving your hand, or in other words, when your hand is drying, you feel cooler? Now suppose those pores are clogged by the generosity of hard water leaving you with its permanent souvenir of soap curd? You cannot feel as cool in summer because the perspiration will not pass off through the stoned-up pores, and you get that sticky, messy feeling, an unnecessary addition to the list of hot weather agonies.

In the shampoo, even as in silks and fabrics, the soap curd again makes the hair stony, and when it is brittle

it breaks and cracks. Most hair dressing establishments and barbers know these things and are careful to have their work abetted by a softener.

The soft water supply is better than rain water because it is drinkable and is freed from all impurities. It can be installed by any plumber, there are no tanks, cisterns, pumps, motors, no extra piping, nothing at all to do but connect it anywhere on your water supply. If extra filtering is needed, filters are installed as sister companions at the same time.

Therefore, before you build have your water supply tested and analyzed. If you are away from a perfected water system, put some water in a bottle, tightly sealed, and pack it safely and mail to a chemical laboratory for analysis. Then write all about your cellar to the softener-maker and he will give you the necessary directions. If you are in a town with a public water supply, ask the water authorities the composition of your water, then write to a water softener manufacturer.

To Summarize

To give you a bird's-eye view of a water softener's great charm briefly, here it is:

You will save 50%-60% in soap.

You will save 50% in the cost of household linen and napery.

You will save untold money in plumbing bills.

You will save money in kitchen pots and pans.

You will save your skin and your health.

You will lessen engine trouble in your car.

You will preserve comfort, energy and time.

You will save babies' skin and health.

You will save the finer properties of your foods.

And best of all you will not need to cogitate on the

fact that all your expenditures for foods, utensils and piping are not in every way proving worth while.

It is hard to think that water, our benefactor, can be a bane, it is hard to think that this elemental everyday Godsend needs correction, but it does and the only way to do it is to soften it.

But above all when building install brass pipe for your water supply and save plumbing bills.

CHAPTER XLVIII

Some Hot Water Solutions

"DO you take your bath in the morning or in the evening?" is a very usual thrust made by the week-end hostess. We confess it always irritates us! Occasionally we want to take our bath in the evening as well as in the morning, and we don't like to have a publicity campaign arranged about our tubbings!

But it is easy to understand this seemingly intimate probing into one's private life! It is necessary because the hot water system usually is capricious or it doesn't function at all; and when the hot water supply *is* efficient, it may be hot, but there isn't enough hot water to go around. Therefore, the hostess must find out whether you're a daylight bather or nightlight bather—hence the query!

The only solution for this state of affairs is to arrange, before or after building your house, for an adequate hot water system. Even though the supply of hot water in the house is probably the greatest factor in making the American home comfortable, it is neglected for questions of trim, rugs, type of motor cars, dogs and liquor, whereas, important as these things may be, your home will lag and sag without hot water.

In an article the length of this one, it is impossible to take up all methods of heating water for domestic use. Therefore I will only touch on the things which seem to me essential, because of my contacts with a questioning public.

Often, we are asked—what are the merits of the automatic gas water heater? Are they expensive? Are they better than the automatic storage (gas) heater or the plain and simple gas heater that is placed by the hot water tank (kitchen boiler, et al)? What are the ranges in price? For what homes are they adapted? Are there other practical heaters besides gas for obtaining hot water? And so on.

Therefore we will try, in the space allotted, to answer some of these questions hurled at us.

First of all, when you think of installing any hot water supply, you must think of the size of the house, the number of lavatories, the extent of the laundry processes, the number of bathrooms and the number of people who want to use these things at the same time. This is the first and great essential, if you would be saved future misery and replacing and re-installations. Secondly, all pipes exposed to the cold should be well insulated. Thirdly, you must think of your purse.

In the gas family there are many types of water heaters. Chief among them are the:

1. Automatic Storage Heaters:
   These have a water storage tank of non-rusting construction in which the water is heated by gas and have besides, the thermostatic control, which cuts off the gas when the water is heated to 140° Fahrenheit. This heater is adapted to homes of the three to six plus bathroom size. There are gas storage heaters too, without the thermostat and so are not automatic and therefore not as economical, etc.
2. Circulating Gas Heater:
   The little gas heater which is attached to the boiler in the kitchen to heat slowly the 30 to 60 gallon water tank, which always holds up the bather for æons and

æons and causes useless gas expenditure for the next re-heating.

3. The Automatic Instantaneous Heater:
   This, it seems to me, fills the need of hot water more simply, swiftly and expeditiously than any other. Especially for the homes having from one to three bathrooms. Therefore I want to explain this device rather fully.

Now that it is invented, it is very simple indeed and consists, briefly, of a casing enclosing a series of copper coils. The other principal parts are: the water entry pipe, a beautifully adjusted valve which is opened and closed by the flowing of the water as the faucet is turned on or off, a pilot light, a carefully contrived set of burners, a thermostat and the connection between the heater and the house water system.

As the water flows by turning on one or more faucets in any room in the house the valve is opened and releases the gas which is ignited by the always functioning pilot light. As the water flows through the coil it becomes heated. The thermostat stands guard and when the water rises to 140° Fahrenheit it shuts off the gas. Here is fuel conservation! No gas is used when it is not needed.

Every effective automatic instantaneous heater works on the same principle. There are three or four excellent ones to be had and they only differ in tiny details, which of course are thought excellent by the manufacturers, but which alter in no way their excellent operation. For example, one firm builds the series of inverted copper cone-like coils in a sectional way so that the cones which are in constant contact with the gas flame can be easily taken out and renewed; some of the casings are finished differently than others on the inside; some have extra packing in the burners, another lines its casing with as-

bestos and so it goes. However, in all cases the burners are protected from the condensation which occurs when the hot gas flames come in contact with cold coils, and have all the necessary devices to make the getting of hot water "pure and simple."

These heaters can be had in four sizes to meet the conditions of your home. For example, one size is best for the one bathroom house, with its consequent needs, for the two bathroom house, for the three bathroom house, for the six bathroom house. Not only the size must be taken into consideration but what goes on in the house. For example, the house that does a heavy wash day performance and often, may be more in need of a larger supply of hot water than the slightly larger house with another bathroom. When in doubt, consult your gas company. With over three or four bathrooms in a house, we would advise the automatic storage type of gas water heater.

There is rarely any repair work necessary, especially if any of these are well installed.

Whereas these heaters are excellent when the conditions are right, as with all machines, they will not work on low rations. That is, if the water pressure is too weak to open the valve to start the gas to ignite from the pilot light, you can readily see that these heaters will not function automatically. Again, your gas company will help you. However, the valve opens so easily that the water pressure must be very low indeed to prevent perfection of action.

The automatic instantaneous heaters are economical when used with care and when installed with care. With these heaters you save fuel by only burning gas when it is needed; you get instantaneous hot water and do not have to wait for it to get hot; if you have a heater of the right size you will not have to wait for others to

finish bathing but you can bathe in your bathroom when others are using theirs; there is no servicing necessary by maid or man in the house, for the heater works by itself; you can have hot water any time of the day or night and in an emergency illness this, of course, is invaluable. These heaters are clean and non-odorous, there are no ashes to cart off, no oil to manage, no wicks to clean or change, no coal to bother about and all in all, the gas heater is a joy and comfort.

Of course, some people can use a piece of machinery and save more money and fuel than others. It depends, of course, on the grey matter used. So, in order to get the best and most economical usage out of these heaters, it is wise to:

1. Use hot water only when cold will not do as a substitute. For every time you use the hot water you are using fuel.
2. Insulate all pipes that have any intimacy with cold air in the cellar, in order that the heat generated will not go to heat the pipes, but to heat the water in them.
3. Use the stopper in the lavatories, sinks or tubs and save the hot water, rather than let it sterilize the plumbing system as it runs away wastefully.
4. Shut off the water when you have had enough, and remember that you need not always fill a tub or basin to the brim to be clean!
5. Watch laundry day proceedings, especially if you have a maid or laundress.
6. Don't leave the hot water for ages before using it, for you will have to run some more and that means using gas again when the first time would have sufficed.
7. Train your maid so that she will realize that hot

water is a civilizer but that it does not come out of the *pipe* only but from your *purse!*

So you can see from the above that grey matter will actually save the green-back. You know it is true in running your car or your washing machine, so why shouldn't it be in this gas device?

Two dollars per person, depending on the cost of gas in your vicinity, the way you yourself use gas, season and climate, etc., is what is computed to be the cost of these machines per month. The cost to install comes to about from $25 to $35 and the initial cost of the heater ranges from around $175 to $390.

The supply per minute of hot water may vary a little, of course. When a heater is scheduled at three or at six gallons per minute, it means that these are the averages. Because of differences in temperature out-doors, which naturally affects the water, it may take a little longer or shorter time to accomplish the heating feat, and of course, due to water pressure there may be a variation too. For example: very hot water can be had by reducing the flow at the faucet. However, the average is per schedule and the action is per schedule, as far as the machine itself is concerned.

In closing this section, consider the following suggestions:

1. Buy the correct heater of correct size for your use. If you do not you will not get the comfort you should have, and you will always be having to schedule baths, allowing for very little overlap in time and performance. Furthermore, you will use just as much gas as if you had the correct size, and over a period of years you will have only saved a few dollars on the initial cost of the apparatus itself. A heater, of course, which is too large, is

an extravagance, but this is easier to guard against than buying the heater that is inadequate.

The heater that is correct for you is like a shoe that is correct for you; you like it and do not get disgruntled with it, and for some reason or other the mechanical device you get to dislike, never seems to work as well as if you loved it!

2. These heaters should be connected with an effective flue to carry off burnt gases. If possible, before you build you should see that the house has a flue for the heater's own individual use. Tell your architect and he will fill the demand.
3. Remember that the gas company exists for your benefit and keeps a staff to help you in any need whatever.

And finally, in this heater, provided you have gas, you have a comfort which is worth while having, for in sickness or in health, in poverty or in riches, in plain sailing and emergencies, in winter or in summer, spring or fall, night or day, your hot water is looked out for by the silent laborer in your cellar.

The usual way to heat your water is to have an efficient boiler which is heated by your furnace or your range. Now as far as these go, they are excellent, but they fall short in the process of purveying hot water because the range, or furnace, must be working almost simultaneously with the hot water demand, or the boiler must be working just before the water is used and it means "starting something" every time a bath or a laundering has to be undertaken.

A Boiler Attachment

There is on the market a very inexpensive device, about $15 for the ordinary private dwelling and with

the installation ranging from $30 to $35 depending upon who puts it in. With this and your excellent boiler and fine furnace plant, you can obviate the necessary sudden heatings of hot water for bath, laundry or any other purpose, and keep the water in the boiler hot and always ready for use.

This is but a small metal (iron, or bronze where there is hard water) box or housing in which dwells a copper coil and which is attached to your furnace and boiler by the orderly pipings, and is applicable to vapor, hot water, steam and hot air heating systems.

Truly, the little coil and housing is as simple as this and yet it accomplishes fairy-like comfort for you, by indirect heating. It is the only thing we know that accomplishes such marvels by indirect means, in the whole world, except it be the old fashioned wife!

However, this is what happens: In the case of a steam heating plant, the little housing is placed below the water line outside of the furnace and connects as it were the furnace with the boiler. The water in the heating furnace circulates through the little house, around its copper coil. The cold water from the water tank comes in through the coils of the housing and gets hot, as the heated water already passing through the coils has passed on to the top of the tank and gradually this "round" continues until the boiler is hot and remains so. This continues as long as there is heat in the furnace.

Of course with these little housings it is necessary to have the best of furnace boilers, well constructed and insulated. It never pays to have an installation of any equipment in heating or water systems that is not put in by a reputable firm which can "show you" at every point that there is nothing better to be had. The best is none too good!

These little housings can be used, too, in connection with your oil burning furnace.

In the case of the hot water system, a little different layout is required. This is so, because the water in the hot water system is not needed as hot as the water in the steam system needs to be to get steam; therefore when the boiler is not working at full force as in warm weather, it is necessary to supplement the heating process with something to bring the water in the boiler to the proper temperature for all household purposes.

This can be done by a gas heater. It can be done with a circulating gas heater which, of course, is extravagant, for it has to burn full tilt every time you want the water and has to heat all the tank when probably only a little water is needed. Hence you waste gas. So the best thing to have here is the medium sized automatic instantaneous heater described above, which will make you quite independent of any other heating layout.

Using the Hot Water Coil

In the summer, when your heating plant is not working at all, the automatic instantaneous gas heater will help you and save trouble and expense. In weather when the furnace is not going at greatest strength, the gas heater is used only as an assistant. It simply gives the water a little boost to cover the discrepancy of the few degrees needed to raise the water to the useful, domestic temperature, or about thirty degrees.

This little coil and its housing is very useful, too, in heating the one room you wish to keep warm all night, or the conservatory, or the nursery. By properly attaching this you can accomplish this one-room-warming delightfully. Then too, it can be so attached to a single

radiator, or to the bungalow type of heating plant in or out of the cellar, so that you are able to keep one particular room warm when the fires have receded in the furnace for the night.

This is really a boon and worth while looking into, for it gives you continued hot water after your furnace is banked for the night, at practically no expense, and relieves you from worrying over the hot water question . . . a relief indeed! For it is very agonizing not to be able to get hot water in the middle of the night, because the fire is low. With this little device you are safe in illness, night or day, with furnace high or low!

For the homes without gas or other means and where electricity is prohibitive, the kerosene water heaters are excellent acquisitions. They heat water with dispatch, simplicity, and without odor or any discomfort whatever. In fact, they are as efficient as are their sister cooking ranges and they differ in construction and general wickness and wicklessness even as do they.

In two hours a 30 gallon boiler is heated and every one can have baths and the laundry need not suffer. Some of these heaters are equipped with thermostats and turn off the flame when the water is hot enough. They are all built with an eye to the general plumbing needs and are very simply attached to the boiler by the plumber.

Kerosene Heaters

Some of the heaters have the oil tank beneath, some to one side on a bracket, some on both sides and on brackets; another firm makes a giant heater, which, with its water storage tank can be used in a home unboilered, and due to its insulation, will keep the water hot in the boiler for about thirty-six hours. Thus it

goes, equipped with excellent burners, with exemption from sputtering by being guarded from the perils of water condensation, etc., with tested copper coils, etc., etc. These heaters, where there is no gas or heating plants, are economical, efficient and comforting. We have used them and can testify to their willingness to do the job readily and well.

The question of electric water heaters, designed to heat the water for the whole house, is a very interesting one, because as yet, they cannot be generally used on account of the expense involved.

Unless there is a special rate for electricity, say three cents or below per kilowatt hour, heating water by electricity for the whole establishment is too costly.

However, as far as the electric heaters are concerned, there are some excellent heaters on the market, some large ones that need special wiring and some small ones that can be attached to the ordinary electric light circuit.

For one-faucet water heating there are some small devices that are attached to the faucet, and the water, as it runs through the copper coils becomes hot at once. Of course, too, there are the immersion heaters which, when put in a vessel of liquid, heat the contents rapidly and well. These are attached to the regular electric light circuit and need no extra wiring.

And so . . . there are no reasons for inadequate hot water in any home in this country, nor is there any need for a capricious hot water supply, for it can be steadied and stabilized if the heating system is well put in and if the water devices are well chosen and connected.

CHAPTER XLIX

Gas as Furnace Fuel

THERE are three distinct methods of heating a house by the use of gas and, while we shall go into details about only one of these, we shall try to give a good idea of all three. The method in which we are primarily interested is heating by means of the gas-fired furnace. In this system the gas is utilized at a central heating plant and may be used as fuel for either steam, hot-water or hot-air radiation. The other two methods are best for use where the climate is mild, where a continuous seasonal demand for heat is not made, or where different rooms in a building need not be heated at the same time. They both make use of an individual self-contained unit to which the gas is directly piped. When heat in a room equipped with either of these types is necessary, the burners are lighted and heat is generated. One type is known as the space or radiant heater and operates on the same principle as the well known gas logs. The other variety makes use of a radiator which is similar in appearance to an ordinary steam or hot water radiator. Water which it contains is heated by burners at its base.

Facts and Figures

Heating has now become an exact science. An expert in the field, known as a heating engineer, can, by estimating the space to be heated, tell the exact cubic feet

of radiation necessary to keep each room at a comfortable temperature. This applies to heating with the gas-fired furnace as well as by the use of any other system, and anyone contemplating the installation of such a furnace can obtain an accurate estimate of its cost along with the cost of radiator installation suitable to his needs.

Coal-burning furnaces can be changed over to gas very easily but unless radical changes are made in the system the gas will not be used as efficiently as otherwise and, although a considerable saving may be made on the installation cost, the upkeep of the furnace will amount to more than if a complete gas system were installed. It has been estimated that the additional cost per year for gas in a converted furnace amounts to 30% more than it would for a complete gas installation. The reason for this is perhaps due to the fact that as a gas boiler is especially designed to suit the habits and characteristics of gas, so is a coal boiler best suited for use with a coal-burning furnace. If you are considering transforming your coal-burning furnace make sure to correct the drafts as a gas-burning furnace requires much less draft to assure perfect combustion.

The rapid growth of the use of gas for heating has been little short of marvelous. Two thousand cities and towns throughout the country are now large users of gas for this purpose. Portland and Baltimore lead in the recognition of gas for heating. One firm in the year 1921 alone installed 50,000 gas furnaces. From these statistics it may be seen that gas-fired furnaces are neither experiments nor novelties.

Important Considerations

Before installing a gas-fired furnace in your home be sure to obtain expert advice on the way in which the

following considerations will effect the use of gas for heating.

1. The type of gas in your vicinity.
2. The rate at which you must buy gas.
3. The gas pressure required by law.
4. The location of your house, its type and construction.
5. The number of rooms to be heated.
6. The insulation of your house.

If you desire to change your present heating system for a gas-fired furnace the following list contains additional subjects to be considered.

1. Piping and main must be changed if not of the correct size.
2. Radiator valves should be adapted.
3. The cold-air intake system should be revised.
4. Warm air ducts should be changed to conform to the use of gas.
5. Inspect with a view to adaptation, chimneys, vents, etc.

No heating system, whatever the type, if imperfectly designed and if installed without due consideration for its particular demands, will be wholly efficient and satisfactory. Therefore, learn all that you can about the furnace you have decided upon and carefully supervise its installation.

The cost for heating a house by means of the gas-fired furnace has, on the average, been estimated to be a little more than if oil were used and somewhat less than if coal were burned. But in considering the cost of gas as fuel it should be borne in mind that with the gas-fired furnace there is no additional cost for electricity for the running of motors or pumps as in some other systems. Therefore, on the whole, there is little difference in cost as compared with other systems of heating.

Fuel costs, whether for gas or for any other heating plants, can be reduced upwards to 33% by proper house insulation. In fact if only the roof be insulated the fuel saving will amount to about 20%.

When considering any heating plant it is well to look not only into the initial cost and upkeep but the advantages which accrue from its use should also be considered, for these, although they many times cannot be figured in actual dollars and cents saving, mean much. In the case of the gas-fired furnace some of its advantages are:

1. Independence from the uncertainties of fuel supply.
2. Even heat through the entire house.
3. Freedom from storage bins and tanks.
4. Ease of humidifying the air.
5. Freedom from ashes, dust and dirt.

After recording the advantages of the gas-fired furnace we might mention the one great drawback to its use. This is the high rate which obtains in many places for the use of gas. However in some districts, at the present time those under the control of 74 companies, there are special rates made when gas is utilized for heating purposes. In my opinion this practice will become more general as the use of gas for furnace fuel grows.

Placing Thermostats

Thermostatic control is advisable for a gas-fired furnace not only for its convenience but because it reduces the cost of fuel by shutting off the gas when the furnace has reached the desired heat and automatically turning it on again when the temperature in the room drops below a given point. Here are a few general rules re-

garding the placing of a thermostat so that it will function to the best possible advantage. A thermostat should not be placed in:

1. Corner recesses,
2. Halls where it will be exposed to drafts,
3. Kitchens,
4. Bedrooms,
5. Positions where it will be exposed to hot or cold air registers or grilles.

Briefly, the thermostat control should be placed where there is no abnormal influence on the temperature of the room but in a position where the general temperature of the house is reflected.

Since the gas companies everywhere have been advocating the use of gas for heating, an increasing number of householders have discovered that they can use an ordinary gas-fired heating unit to heat homes in which hot water radiation is used. The heating lines are cross-connected with both the regular boiler and a heating coil. During mild weather the heating coil alone may be used and in extremely cold weather both can be pressed into service.

In some sections of the country where the gas supply cannot be relied upon it might be wise to cross-connect a gas burning system with a furnace to burn coal. However, this will not be necessary except in extraordinary cases.

To sum up the case for the gas-burning furnace we might say that the use of gas for heating is no novelty to most of us. Most of us have at some time turned on the gas in the kitchen to warm it and, if you will remember the heat that was generated in this way, you can easily imagine how well a system which efficiently utilizes gas for heating will function.

A gas-fired furnace is not dangerous although every

fuel has its dangers if improperly used. Each gas-fired furnace is supplied with an automatic safety gas cut-off which insures its users against the dangers of escaping gas.

J. Arnold Norcross speaks of gas as furnace fuel in this statement:

"There is nothing uncertain or experimental at this time in the appliances for heating buildings with manufactured gas. They are practical, quiet, efficient, reliable and safe. The necessary installation is simple, requiring no fuel storage, electric motors, pumps or any equipment liable to develop individual troubles."

CHAPTER L

PORTABLE GAS

WE can read in this book of home-made electricity, home-made ice and other domestic phenomena, and now we arrive at the home gas plant, which is an appliance employing a product sometimes called "bottled" or compressed gas, because it is brought to your home in cylindrical tanks and piped from these tanks, instead of being piped from the city or district gas plant or from natural gas sources.

For the most part, this portable gas is made from natural gas or products of natural gas, treated to laboratory processes and tests and compressed in a pure state. Some varieties are meant only for cooking and heating, but there are others that can be used for illumination as well.

The complete equipment consists of a cabinet, made of steel and mounted on a concrete base, into which the cylinders of gas—usually two in number—are fitted on delivery. The gas is in liquid form, and vaporizes as it flows from the tanks into the piping. The average cylinder holds fifty pounds of liquefied gas, although some firms supply a cylinder of larger capacity. The tanks are connected to a pressure reducing system, and when the contents of one of them are consumed, connection with the new one is made by the turn of a valve.

The cabinet is unobtrusive and weatherproof, and can be set up without difficulty in some convenient spot

behind the house. If initially installed in the proper way by the company itself or by a licensed gas fitter or plumber recommended by the company, the equipment requires no further care until the gas in the cylinders is consumed and it becomes necessary to renew the supply. This is taken care of by the company, which maintains a Service Department for the purpose. It is the better part of valor to notify your purveyor of gas as soon as the contents of one cylinder have been used, so that you will always have a reserve fund on hand.

As to Costs

The home gas plant is, all things considered, really an inexpensive method of solving a troublesome problem and relieving a trying situation. The initial cost, covering the complete equipment—the cabinet, piping, cylinders, gas, and in some cases the cooking range with which it is to be used—generally runs from about $200 to $500, depending, of course, on the type and quality of the equipment chosen. Installation charges are included in this. The cost of the gas itself, in use, equals that of electricity at three cents and four cents per kilowatt hour. It costs less than city gas at $3.00 per thousand feet, and is a little more expensive than coal. In return for this expenditure you have a fuel which insures evenly heated living quarters, a cool kitchen, swift cookery, a happy absence of soot and ashes, and, in some installations, a satisfactory source of illumination. In addition to all this, you have the comforting assurance of the fact that the system has been approved by the Underwriters' Laboratories of the National Board of Fire Underwriters, which is adequate proof that it is as safe as it is possible for any light-and-heat-producing device to be. If you live in a vicinity where there is no

gas main, no electricity cheap enough for cooking or no electricity at all, and no oil route, these are points worthy of your careful consideration.

Remember These

Before arranging for the installation of your home gas plant, before even selecting the company from which you are going to purchase, consult your best local hardware dealer or plumbing concern, for they will know the gas firm that will give the most reliable service in your section of the country. Proper installation is of the highest importance, but the most efficient equipment is useless unless certain continued service in renewing your supply of gas is assured you. Buy your gas from a well known, long established, financially responsible firm, and one that has been authoritatively recommended.

Be sure that your gas equipment is one of those that has been approved by the Underwriters' Laboratories. Also, that each of your tanks holds at least 2000 cubic feet of gas, and requires no guidance except from the supply man. As for the gas itself, it should not deposit soot on cooking vessels; it must be of a quality that does not freeze at ordinary low temperature—even at forty degrees below zero; and it must always be uniform throughout the cylinder, regardless of the point from which it is being drawn.

Bottled gas can be used with any good gas range, if certain slight changes are made in the orifice leading to the burner. Adjustments of this kind are arranged at the time the gas plant is installed, and need not be worried about again. Of course it is always better to purchase gas appliance and range at the same time, as this insures perfect co-ordination.

Certain gas heaters with proper orifices (burners)

work very well with some of the portable gases. This is another matter best decided on by the dealer.

Any good ironing machine will work exceedingly well when heated by portable gas, if it has a good and sufficient air mixer, for most of these ironers are built for a low B. T. U. gas, and portable gas is a high B. T. U. gas and needs more air to help its combustion.

With proper adjustments, water heaters have been found to take very kindly to portable gas.

Hot plates and laundry stoves can be comfortably used with portable gas, as they are usually equipped with air mixers.

Quite different from the "bottled" gas equipment we have been considering is the gas machine, producing a fuel which is made on the premises by reducing gasoline to a gas under pressure. This machine makes gas for illuminating and cooking. It consists of (1) An air pump operated by water and air, placed in the cellar, supplying air to the generator and sending the resultant gas through service pipes; (2) A gas generator buried in the ground; (3) The mixer buried in the ground near the generator and equalizing the gasoline vapor (from generation) with air, in order to afford a smokeless, uniform gas for burning. It is not costly to run, and it is worth your while to investigate it before you buy your gas plant.

Gas Machine Advantages

This machine and others of its kind eliminate delightfully:

Cost of wood for kindling fires, and of labor in attending to them.

Cost and labor of removing ashes, not only in bulk

from stoves and premises, but also in the form of dust from the house.

Cost and labor of cleaning range, flues and chimney.

Cost of extra space required by coal outfit and storage of fuel and ashes.

Cost of wear on cooking utensils, which always last longer when gas is used.

Increase of fire hazard and insurance rates because of danger from overheated flues and defective chimneys.

Greater cost of maintenance.

Time wasted in regulating fire.

Waste of food in cooking due to inability to regulate temperature properly.

CHAPTER LI

REFRIGERATION BY GAS

GAS refrigeration is as popular a conversational factor now as electric refrigeration. Electricity, the king of automatic processes, has reigned so intensively during our time that the fact of anything coming in to equal its prowess is sufficient to cause rampant commentary. The glory of the gas machine is not that it supplants electricity, but that it can be used where there is no electricity, and furthermore it in no way ousts the electric refrigerator which can be used where gas has not been and probably never shall be. Therefore we like to think of them as twin opportunities, catering respectively to the non-electric and non-gas areas inexpensively and with great comfort.

Refrigeration, whether by lumps of ice, electricity or gas, is fundamentally the same process. (See Chapter XII—Passing of the Ice Man.) And so we find them casting about for refrigerants or materials that will boil or vaporize at low temperatures, using up the heat and leaving the surrounding air cold. In the case of the electric refrigerator, electricity does not refrigerate but sends the refrigerant about its business through the condenser and coils and keeps it cycling as it condenses and expands from liquid to gas and to gas from liquid, subtracting heat over and over again.

The refrigerants used have been for the most part ethyl chloride, sulphur dioxide, and ammonia. Ammonia is used chiefly for the refrigerant in gas refrigerators.

The domestic gas refrigerator, of which there are but a few makes now on the market, looks about the same as the average of even the ordinary ice refrigerator. For home service, however, there is no motor and all the works are contained in a small space usually as a part of the box. The connection outside is simply that of vacuum pipes to the gas and water supply.

So there is nothing unusual about it, for the gas as the motive for the refrigerant on its way through the coils and evaporators, being carried and turned, withdrawing the heat from the interior of the refrigerator and leaving the air in that section so cold that it freezes the water left in the pan to be made into ice cubes, and keeps the air so cold that food keeps splendidly.

For being explosive, we shall try to simplify principle to give the story of the play—which is more dramatic and vital to the world today. To begin with, the necessary odor of gas in your refrigerator is merely the absence of heat from the gas itself and the ammonia to be kept cool, as it were. For everything has a certain amount of heat—even in the polar.

There are two types of refrigerators. The basic principles are similar as we will describe the most familiar (the intermittent type) first, and then tell you of the continuous type.

In the intermittent gas refrigerator, ammonia is the refrigerant and water is the absorbent. The apparatus consists of boiling and cool tanks. There is the boiling chamber back which heats the ammonia and water before it starts its trip. Then there is the condenser, and the evaporator or the cooling unit inside the refrigerator chest. The gas makes its appearance as flame under the generator which heats the ammonia and water, drives the ammonia out of the water to pressure tank and the condenser, where it liquefies as pure ammonia.

leaving the water or weak solution of ammonia and water behind in the generator. Then the ammonia flows by gravity into the evaporator or cooling coils inside the refrigerator. When the heating time is over and the gas is turned off automatically, the cooling water passes off through tubes from the condenser where it has been liquefying the ammonia gas to a coil inside the boiler absorber where it now cools the remaining water there.

Ammonia is very soluble in water. Hence as the water in the boiler is hot it sends off the ammonia gas and when there is a reduction of heat and pressure due to the flowing cooling water in the coil of the boiler-absorber, the water there absorbs ammonia. This is why the gas refrigeration is said to be done by the absorption process.

Now let us see just how the cooling is effected. After the heating has been done, the evaporator in the chest is full of liquid ammonia. Now when the water in the boiler is cooled by the flowing city water coil in it, there is a consequent reduction of heat and pressure in the boiler itself. Because this system of refrigeration requires no valves or machinery that obstructs or opens up the pipes, if pressure is reduced in one place in the system, such as the boiler, the pressure is equally reduced all through the apparatus. Now then, the pressure is reduced on the surface of the ammonia in the evaporator, and the ammonia gets excited and boils, because ammonia boils at about zero° Fahrenheit under the pressure now in the machinery. And because it does get excited and boils at a very low temperature, as we said before, is the reason that it is used. Not only does it boil, but it tends to expand to 1,000 times its volume. So as it boils it gets expansive and this habit is its method of turning into gas and this gas instead of wasting itself absorbs from the refrigeration the heat units through the walls of the evaporator

and is carried back into the weak solution in the boiler re-absorbed, ready to start again on its Dr. Jekyling and Mr. Hyding—from liquid ammonia to ammonia gas to liquid ammonia, over and over again.

The gas refrigerator machinery is hermetically sealed so there is no loss of ammonia through leakage in the process, which of course is a saving, because ammonia is expensive. This ammonia will remain in good condition indefinitely, circling around and around in its useful journeyings.

The journeying or cycling takes from about five to fifteen hours for the average household refrigerator, but depends on the plant or size.

The same primary requirements for a refrigerator are as necessary here as for an electric or an iced refrigerator. The case must be of excellent manufacture and the doors and all parts fitted closely, while the interior should be smooth and easy to clean and the wall and door insulation as perfect as possible. If any refrigerator cases could be made so well insulated that they absorbed no heat from the room, there would be no reason for operating the machine after once cooling the box, for the ice chest would remain cool except for the fact that food contains heat that must be subtracted in order to keep it in good condition. But it is easy to see that every time you open the door of the refrigerator, heat enters, and it is almost impossible to make a chest that will not absorb heat from the outside somehow.

Advantages Gained

However, very little gas is used. It costs possibly less than a plate of ice cream per day, depending on your gas rate. But the most valued thing about the continuous gas operating process is that there are no mov-

ing parts to be oiled, to get out of order or to make a noise. It is absolutely noiseless and simple to maintain, for there are no valves to become ill or to shift and the machinery is auto-maintaining.

The heated parts are water cooled in the gas fired refrigerator. Usually we find both water cooling and air cooling in electric refrigerators. However, air cooling is used where there is no tremendous cooling necessary and water cooling where you must get maximum efficiency out of the machine. Air cooling is very convenient in electric refrigeration for the reason that such machines have electric motors to drive the fans which increase air's ability to cool, and especially does it do this in warm weather. The gas fired refrigerator has no moving parts and, therefore, water is used because of its great power of absorbing heat.

Water Cooling

You may be informed by refrigerator salesmen, who sell the electric refrigerator, which is air cooled, that the gas refrigerator uses an exceptionally large amount of cooling water. This is not the case, for if you will examine the gas fired refrigerator you will see that the water passes through in drops, and the cost of water (according to taxes in your district) is never more than five cents a day (often far less) and apartment dwellers would have no water tax, in most places.

As to the cases themselves: The makers at present are building excellent ones finished beautifully and they measure up to all refrigerator case requirements.

Now for the continuous absorption machine which is practically new in this country, although it has been used for several years abroad.

In this as in the other type, there is the generator tank

which houses the water and ammonia before it starts its tour. Then there are the condenser and the evaporator, or the cooling unit inside the refrigerator itself. The gas appears as flame under the generator which heats the ammonia and the water, driving the ammonia out of the water. Thus gas is formed and passed into the condenser where it is liquefied as pure ammonia, leaving the water behind in the generator. Then the ammonia flows by gravity into the evaporator, or cooling coils inside the refrigerator, where it comes in contact with an atmosphere of hydrogen which causes it to evaporate the same as air has caused the water to evaporate on your hand and leave a cooling effect. These two gases mix and flow by gravity back to the absorber where the ammonia is again absorbed by water coming from the bottom of the generator, releasing the hydrogen which will flow in its cycle back to the evaporator.

The liquid ammonia will flow from the bottom of the absorber back to the generator where it is heated again and passes through the same cycle over and over, giving continuous refrigeration and allowing the temperature of the refrigerator to be more constantly maintained.

The gas refrigerator industry is very young and very few gas refrigerators are now on the market. There is now being tried out, however, a gas machine employing compressed air for domestic use. However, the subject of other refrigeration devices is ever being enlarged with new and practical additions, so let this not deter you from purchase when purchase is possible.

In summing up the gas refrigerator's salient points:

1. It has no moving parts, which is the chief benefit, for on this hang the facts that:
   Servicing is decreased.

The hazard of escaping refrigerants is obviated. The cost of replacing used parts does not occur. There is absolutely no noise.

2. Reduces the cost of refrigeration.
3. Keeps a constant low temperature, automatically.
4. It can be placed in the dining alcove, for it can be seen and not heard.
5. Obviates buying new refrigerants for years.
6. Obviates oiling of moving parts, for there are none.
7. Banishes discomforting drains which must needs be cleaned, when present.
8. Operates by gas at about 3 to 9 cents a day, depending on the local gas rate.
9. Obviates, of course, the uncertainties of ice delivery.
10. And embraces the good points of all other refrigerators.

In any discussion of refrigeration, whether by ice, gas or electricity, it is wise to remember that however effective the refrigeration may be, however much ice you use, however good may be the electric or gas mechanisms, you will not have good refrigeration unless you have certain things inherently present in the refrigeration process. (See Refrigeration: Chapters XI and XII in this book.)

CHAPTER LII

THE GLASS OF LIFE

HAVE you ever wondered why you do not tan if you sit in a solarium or behind a big glass window or work in a greenhouse, hour after hour? The reason is simple. The ordinary glass used in our windows and solariums is such that it prevents the penetration of the vital ultra-violet rays—that part of the sun rays which tans. But at present there is glass on the market which brings the outdoor sun indoors and which, besides coating you with tan, will:

Kill bacteria and germs (the sun is the supreme disinfectant); improve the skin's condition and assist in cure of skin diseases; increase the haemoglobin (red cells) in the blood; increase our powers of absorbing and retaining phosphorous lime and iron in the body; assist in the prevention and hasten the cure of rickets; assist in convalescences; increase disease resistance; and increase and build up and maintain a robust vitality.

A little explanation as to what the ultra-violet ray is may be a help and may be confusing. Yet it is wiser to give it a brief description:

First, these vital rays of sunlight are a limited portion of the sun's emanations and are invisible, have no warmth and are filtered out by the ordinary pane of glass. Second, think of the prism or the colors you see in a rainbow or on a shaft of light entering the room as a sunbeam. The colors, as you recall, range from red

to violet. The invisible heat rays of the sun are those beyond the red rays and at the violet end of the spectrum; beyond the violet rays are the invisible ultra-violet detectable by chemical reactions or fluorescence. It is these ultra-violet rays that this new glass gives to us indoors.

The reasons for solar rays being more valuable than heat rays from a stove or the like is that solar rays penetrate deeply into the body (for the rays are hard) and warm the blood stream, while the stove rays (soft) are absorbed too near the surface of the skin to reach and warm the blood.

Scientific Manufacture

With the knowledge of the super-value of these sun rays, interested folk have set about to find a glass for our windows that would be inexpensive and transmit the ultra-violet ray and thereby give back to our civilization the sun's full benefit, which the savage enjoys in his cave doorways and outdoor ramblings. And so we again see the manufacturers and the scientists working together to bring back artificially the basic principles of life that civilization tends to destroy. It is truly amazing to realize this and see the proofs of it in not only this new window glass but in ventilation, feeding processes and so on *ad infinitum*.

But to return: We now can buy at no great expense a glass for windows, porches, skylights or other apertures through which the sun will tan and invigorate us, and make our sick children well and adults healthier. It is a simpler way to get the ultra-violet ray than by the new lamps which are of such high value in assisting in curing tuberculosis, rickets and glandular affections.

Experiments have been carried on in England which will show you the value of having at least one room in your house equipped with this health-giving glass. But, in order to forestall the question, "Is the glass valueless when the sun doesn't shine?" first let us tell you that the most interesting thing of all about the light we live by is that sky-shine and cloud-shine give us the vital ultra-violet ray as well and better than sunshine. Therefore this new glass is at all times (except in the darkness of the night) a blessing without disguise.

Now, for one of the experiments so graphic and so telling. Two schoolrooms in a very sooty town were equipped, one with the new glass, the other with the ordinary window glass, and were used for two groups of children of the same grade in years, health and brain power. What happened showed conclusively that this glass has invaluable qualities.

In England schools are glazing the windows with this new glass; hospitals, too, of course see its value. America, which has begun to experiment with this glass, is waking up to its merits. It should not be long, we dare say, until all factories, office buildings and public buildings, where folk are home all day, will be forced by law to use it and thus do away forever with the pallid worker whose vitality is low because he can neither find time nor money to have a garden, play golf or sail a boat.

Fancy the result in efficiency that will ensue when these great glassed factories and schools are equipped with this life-giving glass. Consider, too, its use in our homes with growing children or debilitated adults. It will make room in our hospitals, for in our homes we can assist in curing rickets, tuberculosis and other ills.

Of course, this glass which admits the vital ultra-

violet rays is more potent as a health adjunct, in proportion to the extent of the body exposed to it. So, in our homes it is wise, as often as possible, to undress and station the sun bather behind the glass in order that he may get the full benefit of its healing. To make this simpler and quite proper, there is made a translucent variety of this glass through which the light comes in but through which one cannot see. Therefore, for complete ultra-violeting, a window can be so fixed that one part of it pulls down to obscure the beneficiary, and so obviate any embarrassment whatsoever from neighbors and passersby.

Concerning Expense

This glass costs a little more than the ordinary kind, but its handling and installing are similar. It comes in every size and looks just like other glass. Furthermore, it can be used for every purpose for which the old glass has been utilized.

Very expensive quartz has been used for the "cure" window before this was invented in England. Consequently, you have probably heard of the new glass in isolated cases.

Everyone knows the advantages and value of sun baths. But it is difficult to get a sun bath outdoors in winter, and when you can get it, it is often too cold to enjoy. With this glass, however, in hotel or private home the ideal sun bath can be taken indoors without catching cold, when it is necessary to expose large areas of the body. So, it is not necessary now to send your children to sanitariums or to Switzerland for sun baths, or to buy expensive lamps. This glass is better in many ways.

All these statements are deduced from the most tech-

nical scientific experiments based on the spectrum and on the amazing habits of light.

It is interesting to note that in some zoos where the animals were sluggish and did not eat or reproduce themselves, this glass was introduced. Very soon the animals began to grow normal, ate with vigor and enjoyment, and increased their numbers.

Dr. Edwin T. Wyman in the Harvard Alumni Bulletin has many interesting things to say of this type of glass in a paper called *Fresh Air, Sunshine and Vitamins.*

"It should be ideal for nursery windows, where the baby can have its daily sun bath, for hospital windows, and a number of possible applications for the use of ultra-violet light in the sun's rays.

"Here in New England, during the warm summer months, it is possible to use direct sunlight in treating infants and children. It is impracticable to expose an infant, and often inadvisable to expose older children, to the direct rays of the sun during the fall, winter and spring months, on account of the cold and consequent loss of the body heat. This difficulty, however, may be overcome by the use of a quartz window or a glass which is transparent to ultra-violet rays in order that the baby may have its sun treatment in a warm room.

"Furthermore, if the present experiments mean anything mankind will be freer from colds and will build up a resistance that only the ultra-violet ray seems able to give. At present cod liver oil and outdoor sunlight are our two great anti-rachitic and disease resistance aids —but now we have indoor sun added to us. . . .

"We find here the probable explanation why negroes with their dark pigment and the dark-skinned Italians are so prone to rickets when removed from their native land. In Africa the negro goes about naked and attains

the maximum advantages from the sun's rays. In sunny Italy the Italian, likewise, spends most of his time out of doors, and rickets there is rare. When these people, however, come to the temperate zone, as in this country, they are forced to wear clothes and are more closely housed. The pigment in their skin filters out many of the already diminished ultra-violet rays in the sunshine, they lose the protective action of the sun to a great extent and, consequently, are prone to rickets."

Thus, not only outdoors, but continuously in our homes can every member of the family be subjected to the strengthening of the ultra-violet ray and join a regime of "back to nature" never dreamed of by Thoreau or any more recent or transitory leaders.

The forecast, then, with a general use of this glass is rosy indeed, for every one can and will have tanned skin and pink cheeks and there will be few pale-faced workers throughout the land. Furthermore, the bony structure of the body, including the teeth, will be strengthened, which is no insignificant item. Indeed, homes will probably be built so that solariums will be as inevitable as kitchens and we shall become pagan in our appreciation, if not in the worship of the sun.

There are already ample lists of users of this glass, glad to testify to its efficacies. Hotels at present are putting in this new type of pane and using it as an added lure to their confines.

Before we leave the subject, we want very forcibly to inform you that the ultra-violet ray treatment purveyed at barbers' and hairdressers' in most cases is hokum. These kind people believe they are giving you ultra-violet rays but in reality you are not getting them. Furthermore, when ultra-violet rays are actually given, they should be given under competent, and specialist physicians, because accidents may result from ultra-

violet irradiations if they are dispensed by untrained persons.

It has been said by some that the glass loses its power to transmit the rays, but as yet this remains to be proven.

CHAPTER LIII

FLOOR SCRAPERS AND POLISHERS

THE floor machine as it exists today is a device so unlike the suction cleaner as to forbid comparison. Yet it does for scrubbing and polishing what the cleaner does for sweeping and dusting. It saves the back and it saves the knees—and it takes the "chore" out of floor scrubbing—the most menial of the household processes. In other words it is responsible for eliminating the disease that Jerome K. Jerome likes to call "Housemaid's Knee," for no longer is floor cleaning in a genuflexing media but is in the erect, standing-on-two-feet classification.

The floor cleaner and polisher, then, is a machine—at a distance looking somewhat like the suction cleaner—a bigger floor piece than the cleaner, a long handle, a wire for attachment to the electric convenience outlet and the tools, or brush attachments, one for scrubbing, another for refinishing, another for wax polishing, etc.

In the floor piece, which is round, is the motor, which can be bought for alternating or direct current. In it too are the brushes which are interchangeable and include those for scrubbing, polishing, scraping, as well as the pads for waxing.

In the floor piece of some polishing machines is the wax receptacle, while in others the wax must be applied to the floor "by hand" as it were.

The "by hand" waxer is a lighter machine and is better adapted to home use although the lighter and

heavier types need no pushing—only steering, as the brushes carry them along.

These polishers are heavier than suction cleaners because it is necessary in scraping, polishing, waxing, to have pressure on the floor. But as they roll from room to room on small wheels the weight of the machines is not noticed.

Pressure and speed of brushes are necessary, so the polishers must be heavy to function well, and they do.

The efficacy of spreading wax on linoleum depends upon its penetration into the pores of the linoleum. To preserve the linoleum the wax *must* reach deeply into the pores. The floor machine can do this far more effectively than the human arm. And furthermore no excess wax is wasted to make the floor grimy and sticky and gather dust. It saves wax because it spreads it evenly, well and deeply.

To keep wood floors in a constant state of polish and beauty, the machine is without equal for swift work, thoroughness and for finesse.

This device should be so shaped as to get into small spaces, between things, and under things, and if it "bunks" into your wood work, it is padded and therefore harmless.

Some of these machines are made to refinish floors, and they sandpaper very evenly.

There is no reason in communities of small homes, where the chatelaine does her own work, that a floor machine couldn't be bought by a group of women and so obviate forever the need of floor scrubbing in the old messy, sloppy, wretchedly old-fashioned fatiguing way. Why not? We know groups that have the mowing machine and other things in this way and it works delightfully. If the lawn mower—why not other machines?

The floor machine can be used, too, for keeping a table top in condition—scraping and polishing it with thoroughness.

With these machines comes a squeegee which pushes the water, as you steer it, into the pan built as a receiver.

At last the squeegee has come into the home. For ages men have used them, yet women, for some unknown reason, though the weaker sex, insist on doing things in the most heart-breaking way, to say nothing of body breaking and spirit lacerating!

The floor machine can do any floor job in one-third the time of the hands-and-knees process. This is so because the weight (40-60 pounds) is centered over the spot being treated and the rapidly revolving brushes couple with the weight and do the trick.

The cost in electric current is no more than from 1-1½ to 2 cents an hour! (See Chapter XXVI.)

The machines referred to at the beginning of this chapter are a little heavier than 40 pounds and there are some from 60 pounds up. These heavier ones scrape and grind too and are usually sold for small hotels and large institutions, etc.

For the home, the scrubber, waxer and polisher is almost all that is absolutely necessary. Yet there are those who want the whole "works" and there is no reason why it cannot be had, for it awaits the happy purchaser.

CHAPTER LIV

VENTILATION AND HUMIDITY

WE are delighted to show in this chapter the advances made in ventilating methods, particularly in humidifiers. (See Chapter XIV.)

In one type of fan ventilator a pull on the switch cord whisks out the stale air, regardless of air currents, with no hurricane or drafts. Another pull on the cord and the ventilator reverses itself, bringing in good outdoor air.

On the other hand there is the central ventilation plant, situated in the cellar, which consists of the heating plant in conjunction with fans or blowers, or blowers alone, whose duty it is to force fresh air through ducts leading to various rooms.

Thus there are systems ranging from the rather expensive to the far from costly.

We are all enjoying the modern theatre with its cool air in summer and warm air in the winter, with the air deodorized, "washed and dried," to comfortable degrees—and we find ourselves delighted to enter a playhouse where we know that no one needs breathe foul air which has been inhaled and breathed out by hundreds of people first.

These plants with huge refrigeration systems, heating systems, air blower systems, ducts and outlets, thermometers and hygrometers are, of course, too costly for some residences, yet they are not out of bounds for

many. However, it is enough to say here that perfect climate can and may be obtained in any residence, if the desire is backed by a mind or purse sufficiently adaptable —and there are some residences in America so furnished.

There is still another interesting type of ventilator which is set on the roof. The devices which look like large revolving mushrooms are designed to revolve in the wind even when it blows only five miles per hour. Through an interior louvre damper construction they send down fresh air through ducts into the factory or home. If there be no wind, the moment the air current gets below a certain point the electric motor immediately starts up. This has been used on barns, factories and power houses. It is being made in small sizes, so we do not see why this device is not good for certain homes, where roof space is such that the mushrooms will not destroy the beauty of roof lines.

Devices for Ventilation

There is another class of devices which fall under the head of ventilation, but which are dependent on the air's will rather than yours. It comprises the air admitters, as we call them, which tend to obviate dangerous draughts. Some are often made to screen the air at will. Generally speaking, these devices are slabs or panels made of wood, metal or glass and various combinations of these materials. Some are built like shutters and some are flat. These slabs or panels are set on the window sill and either extend upward at an angle from the window itself with an air gap between the window and the upper end of the panel or slab, or are held in place by the window setting down tightly on the upper end of the slab. There is no fan or blower. They admit air from the street blowing your way, allow air to come

in during rain or storm without admitting the elements themselves, are without a direct draft and so are very excellent as far as they go. We use one type because our bed is near a window and we can raise it with impunity and know that with this device the top of our head will not freeze! Among these air admitters some are adjustable so that they fit any window and some have to fit to measure. One of the most interesting ones we have seen is of glass fitted with a screen attaching its top edge to the opening end of the window. This screen is of copper and beneath it is a louvre which can be opened and closed to admit as much air as is needed. The screen, too, keeps insects at bay, while fresh air enters without draft and the view is not obliterated because the glass permits of perfect sight-seeing.

There is also a class of air conditioners of which no doubt you have heard which supply ozone to the air, but these are devices not yet perfected for home use.

To be quite proper, however, fresh air must also have a certain moisture content and for that reason humidification is necessary. In the average heated living quarters the air is changed throughout the entire space about once every hour. This is due partly to the opening of doors and windows, but primarily to leakage or infiltration. Thus in the winter time if the air comes in at a temperature of 22°, even with a relative humidity of 86%, when heated to 70° it will have a relative humidity of only 15%. To condition this air satisfactorily there should be added to it approximately 2 1/3 grains of moisture per cubic foot of air; or in other words, for an average room there should be evaporated and distributed about a pint of water per hour.

Moisture in the air is necessary for our membranes' health. Relative humidity is what it is generally called, and we need from about 40% to 60% to be comfortable,

depending on the temperature. At 68° Fahrenheit a humidity of 60% may be a little high, but it is better sometimes than the 10% to 15% with which we usually scrape along. From 42% to 45% is the ideal for the ordinary dry bulb thermometer in our homes, but for proper living we should also have a wet bulb thermometer and hygroscopes which give us an idea of the moisture condition.

In winter, when the air from the outside is artificially heated, its percentage of moisture is materially reduced. For example: even if the outside air be completely saturated at a low temperature and this air be warmed to 70° without increasing its moisture content, it will result in an extremely dry atmosphere by reason of the fact that dryness is not measured by moisture content, but by its relative humidity—in other words, by the ratio between the actual amount of moisture contained in the air and the total amount of moisture the air is capable of retaining at any given temperature and pressure.

Saturated air at a temperature of 70° carries many times as much moisture as it does at 20°, so that the total moisture content of the cold air, even if saturated, is but a small fraction of that required to saturate the warm air. This sometimes results in houses on cold days having a humidity of less than 10% of saturation, whereas the human system does not readily adjust itself to a relative humidity of less than 40%.

Humidifiers

Sprays and centrifugal atomizers send atomized water into the air at constant rates, one by spraying, the other by breaking up water into a fine mist. These are ideal methods for promoting evaporation, but as the moisture

is emitted in the liquid and not in the gaseous or vapor state, unpleasant dripping may occur.

One of the household humidifiers claims also the advantages of the centrifugal and atomizing effect, obviating the disadvantages of drippy ones. In this machine the water vapor is picked up by air passing through it which emerges practically saturated but with no water particles or spray or mist. This is a small, portable device in which the air passes through a very fine water spray. By this means the air is not only thoroughly washed, but picks up water vapor and is delivered to the room nearly saturated. It will evaporate from a pound to a pound and one-half of water per hour with a motor of only 1/50 horse power and costing about one cent per hour to operate. What water is not picked up by the air falls back into the bottom of the container for re-use. The container holds six quarts of water—sufficient for eight hours' operation at maximum efficiency.

The device is simple in construction and has only a few parts. There is a cylindrical container 11 inches in diameter by 12 inches high. In this an electric motor is suspended vertically. The fan and centrifugal pump are mounted upon a common hub and are carried on the lower end of the motor shaft. The rheostat or controller is attached to the cover plate of the container and is operated by a knob on top, with which is obtainable a wide variation in speed. The weight of this humidifier without any water is 15 pounds, and the device is easily carried about by means of a convenient handle and can be plugged into any lamp socket. It is not absolutely noiseless at full speed, but at times when a slight hum would be objectionable the speed may be reduced and the hum will be cut down proportionately. The cover plate with motor fan and pump attached is easily removed for

rinsing the container. The sludge or air dirt collected will surprise you!

Humidifying also can be done from a central point in the cellar by means of a humidifying tank and fan in conjunction with the hot air furnace, which sends properly moistened air to rooms furnished with ducts from the humidifier and blower.

A very simple relative of this device, made by the same firm as the above-mentioned central plant, is the smaller one which can be put in a room to supply much of the needed moisture and fresh air. There is a simple device which consists of a pan of water in which rests a cylindrical casing which encloses a wheel of thin metal vanes. The force of air from the fans makes the vanes revolve and lightly touch the water. The air passes over and evaporates the water on the vanes and moisture is disseminated without spray or mist. A blade 4 inches wide by 16 inches high offers thirty-six square feet of moist surface for evaporation, over which pass 1,000 cubic feet of air per minute—at a cost of 1 cent for four hours' current. It is claimed that this device provides: balmy air movement; almost automatic humidity control; and washed air free of much dust. It can be put on a shelf; it can be attached to the electric light socket; the fan is usable without humidifier; it is rust-proof; no piping is necessary; and it is noiseless.

In such a chapter as this we have been unable to touch every ventilation and humidifying device and system. However, we have striven to give you a bird's-eye view and hope it will stimulate you to review your own atmospheric conditions and thereby arrive at better health and happiness.

Besides, a good ventilation system will keep the new and delightful kitchen and country house ginghams from too much immersion in the washing-machine and

keep other furnishings and clothes from a frequent visit to the cleaners, because the dust is sped on its way and is allowed no resting place. Particularly is this true, of course with the ventilation systems that actually "wash and dry" and dust the air. Yet the small devices do much toward keeping down rehabilitation costs of body and possessions. With the proper air conditioning, cellars can be as healthy as above stairs!

CHAPTER LV

*HEAT'S PLACE IS IN THE HOME (INSULATION)

UNWITTINGLY, we have been overkind to the great outdoors—We have been paying millions of dollars in these United States to heat the air outside of our homes. We complain regularly every winter that our fuel bills are high and that we do not get the heat that we should get. We have the feeling that our houses are excellently built and that there is no fault there, and we look no further and suffer.

But we forget that lumber, hollow tile, concrete, stone, brick, and other material used in our walls and roofs are excellent conductors and let the heat pass out through them in the winter and pass in in the summer. These seemingly impervious materials are not heat barricades.

To give you an expert opinion of the loss annually of fuel energy, we quote what the late Charles P. Steinmetz said in an address in 1923: "Our present structures are causing annual leakage costs of literally millions of dollars' worth of heat. The seriousness of this loss is not realized because it is not actually missed and cannot be specifically appreciated. But the loss is there and looms as a serious problem. The house of the future will be scientifically built from the standpoint of heating."

A Report of the Bureau of Industrial Research, based

*Courtesy of *Country Life*.

on a large survey, states: "The fuel consumed in 16,000,000 homes of Northern States is fully 30% and probably 50% more than would be necessary if standards were maintained in materials. The heat which pours upward through the roofs of buildings in Chicago, New York, and every other large city where artificial heating is required during part of the year, represents a wasted expenditure of fully a billion dollars every four years. . . . The time-honored fallacy that air spaces between roof and upper ceiling serve to stop heat losses is discredited. Owners of buildings have not been taught that heat is transmitted through lumber, brick, and stone just as it is through glass, but less rapidly. Many homes in America have a fuel cost equal in a period of twenty-four years to the first cost."

Now, for all these reasons, manufacturers and those interested in house construction have put their minds to it and have found the way to obviate this loss of heat with its consequent discomfort in health and purse, in the installation of insulation which acts as underwear for the building, keeping in the heat. There are three classes of linings or insulations, the rigid, the flexible, and the semi-flexible, which are put inside the walls and roofs to prevent heat escape. These consist of, (1) cork board; (2) compressed cane fibre in board form; (3) eel grass, felted between heavy paper sheathing; (4) wood wool, between heavy paper sheathing; (5) semi-rigid vegetable fibre; (6) vegetable fibre quilted between paper shavings; (7) cattle hair; (8) semi-rigid pulp felted between heavy paper shavings; (9) asbestos, in various forms, and new materials are being born as time proceeds.

All insulation must fulfill the following requirements: it must resist heat flow; be absolutely sanitary; vermin, and mold and moisture proof; fire retardant to certain

degrees; displace in the building the minimum space; possess structural strength enough for the purpose; be easy of application and enduring enough to outlast the building; non-odorous; and of reasonable cost.

Besides these things, insulation is a means, more or less, of governing sound. Some of the types of insulation do this better than others, so that if you require insulation against sound you must resort to the type which does the work the best. For example, if you have someone in the house who practises an instrument, or children who romp and play, you can see distinctly why sound-proof rooms would be of great value.

The application of insulation not only keeps a house safe from cold and moisture, but it saves the use of many times its own thickness in wood, mortar, brick, etc., and reduces the fuel bills about 33 1/3 per cent. Then, too, the mortgage companies are beginning more and more to demand proper insulation and sound governing because it increases and insures the value of their investments.

With insulation installed, you can build in isolated, wind-swept districts, or in bright, tropical heat, and you, yourself, will be able to control the temperature indoors, and will not be invaded by the outside elements unless you invite them. In this way, you become a real master of the house and not a puppet of chance.

For some time large factories with great expanses of roof have used insulation because it is necessary to save fuel in large industries, and to prevent damage through the condensation that occurs when the hot air inside meets the cold roof. This condensation rots the materials of the roof and makes constant repair necessary.

Now for a brief description of the types of insulation that can be bought at present:

Eel grass is a flexible type. This grass is sandwiched between prepared paper sheets, and sometimes between asbestos sheets which makes it even more of a fire retardant. It is sewed together tightly and looks very much like a bed quilt, and it keeps the house dry and warm, and quiet to a certain extent. This has been used by Arctic explorers to keep in the heat generated inside the cabins. It can be applied to brick veneer and frame without plaster, and is equal to from twenty-eight to forty layers of building paper, which gives some idea of its value. It will last a hundred years and will not decay.

Wood wool is another flexible insulation—the residue of the lumber industry, sandwiched between prepared paper; with its countless little air spaces (as found too in the eel grass), it traps the warm or cold air and will not let it go. Being semi-rigid, it is a simple matter to turn corners in building construction and it is easy of application. This is also wind-proof and water-proof and dust-proof, even as its confrère above. Both come in rolls.

Degummed linen is really a flat material held together by compression, with no foreign substances. It is semi-rigid and bending does not break it. It is a trifle more expensive than some of the others but has remarkable lasting qualities and pretty nearly all the requirements of a good insulation. As a non-conductor it is equal to twenty-seven times its own thickness in concrete, four inches of lumber, and seventeen inches of brick and mortar. It is one of the best sound governors known and is used in concert halls and auditoriums to keep sound from getting out and other sounds from getting in. Great power plants use it for this reason, and for the saving of fuel and the guarding of its workers from undue noise. It is of a lovely brown color, but it can not be used like some other insulations as a decorative factor.

It is bought by the square foot, cut as required, and joined in air tight joints.

This, like some other insulating, has been used in the freighting of perishable fruits so that they arrive in good condition no matter how long they have been kept or through what heat or cold they may have traveled. This, with its allies of the flexible type, can be put around a flue or pipe to isolate the heat in the proper place.

Cork board is another invaluable insulation. This is a rigid variety. It is made of ground cork compressed and baked in metal molds after all the foreign matter has been removed. The resin in the baking spreads and coats each particle, making it moisture proof and obviating the necessity for any foreign binder. Next to asbestos, it has the greatest fire retarding properties. Although it is a sound governor, it is not quite so good as some of the others. It, too, is inhospitable to vermin, moisture, and decay. It has great lightness and will not chip or granulate. This can be used with frame, brick, with a portland cement backing, and plaster can be applied on it without the use of lath; baseboard, picture molding, and window and door frames can be nailed directly on it without the use of nailing strips—a great economy.

Cork board is best used from an inch and a half to two inches thick. Some types of this are equal to sixteen inches of brick, eight and a half inches of hollow tile, and two and a half inches of lumber, which means that you can save in actual dollars and cents by purchasing less building materials than if you did not use insulation. This applies in various degrees to all insulation that is good.

If we may quote from our own records:

A house was to be erected with eight-inch tile and

four-inch brick. When cork was designated as an insulation the tile was changed to four-inch and there were four thousand feet of this tile at ten cents a square foot. Four hundred dollars was saved here! The cork, too, displaced the 2,080 square feet of lath at three and one-half cents a foot, which saved in this instance $73. The heating and ventilating engineers had estimated the radiation at 1,660 square feet, but when they heard that an excellent insulation was to be used, they *cut this figure to* 992 *square feet, or* 40%. The 1,660 square feet of radiation came to $3,070 or $1.86 per square foot, while the 992 square feet at $2 a square foot, came to $1,984; consequently in the heating plant there was a saving of $1,086. The total cost of the insulation, including overhead and profit, was $1,233, so that the immediate insulation actually saved this householder $326. But this isn't all, for with a lining to his home, he saves at least 40% of his fuel bill each year.

Cane fibre is a rigid insulation with great structural strength, made of sugar cane fibre felted together without foreign substances; it can be used inside the walls and outside the walls; for it takes paint and has a high decorative quality even without any cosmetics. It is an excellent insulator, inside or outside the walls, and is often used as wall partitions, to cut off sound, or simply as an insulating material. In rehabilitating old houses this material is delightful, because replastering need not be done, as it can be nailed over the old plaster, creating little disorder and making a quick job possible. Five-sixteenths of an inch in thickness, it is equal to eight inches of brick, twelve inches of concrete, and fifty layers of builders' paper as a heat barricade.

If your garage is cold, this is an excellent thing with which to cover the walls.

Asbestos is the best fire-proofing for general use that

we know. It is rather heavy used by itself, but in combination it is excellent. For fire screens, around stoves and ranges, nothing is better, of course. It is used often with some of the other insulations on fire doors, where the fire hazard is great.

It is well when insulating the roof to double the thickness, so if the insulation man suggests this, he is telling you the right thing. If insulated correctly, the roof will not decay through condensation and will keep in the heat in winter and keep out the heat in summer. Furthermore your house heat will not aid the sun in melting the snow on your roof and manufacture icicles! Let the sun do this—and probably the snow will "dust off" leaving your roof dry and your head and the heads of passersby safe from falling ice.

There are new insulations coming to market. We saw a mineral deposit that when electrically heated, was like spun silver. It too, can be used for making silver paint!

Date Due

D 15 '3'

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APR [illegible] '56

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